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THE FOUNDRY

A TRADE JOURNAL

DEVOTED TO THE INTERESTS OF THE WHOLE FOUNDRY BUSINESS

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MARCH 10, 1893.

Vol. II. No. 7.

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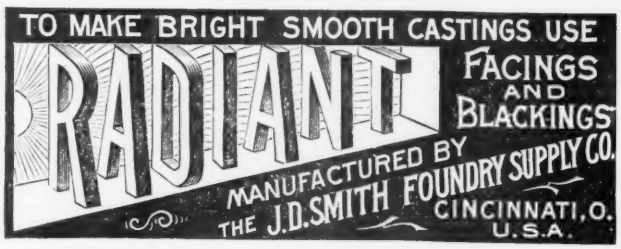
DETROIT, MICH.

10,000 BARRELS SOLD IN 1892.



A Facing or Blacking to be satisfactory for all kinds of castings HAS TO BE A GOOD ONE, and, although every manufacturer of Foundry Facings claims to make it, we can truthfully state that before RADIANT was introduced, the foundryman in general was trying every Facing he was asked to try, with no uniform success, and the foundryman who has never tried RADIANT is still looking for something satisfactory, and we are still looking for this individual, to tell him about the only successful, uniformly, satisfactory Facing in the market.

Are you buying three or four kinds of heavy bag facings besides a core wash? Yes, well we tell you that RADIANT Facing or Blacking will take the place of *all* of them, and the castings on which it is used will be more satisfactory than ever before. Not only can RADIANT Facing or Blacking make your castings more beautiful in color or appearance, and save you money by buying less facing, but, with its use, you will find the castings separate from the sand with a touch and the cleaning of castings almost wholly left to the "Chipper". RADIANT Facing or Blacking will answer for every job you put in the sand, from the smallest to the largest and heaviest work, and when mixed with water will make as good a wash ss you can buy for the price.

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In all that its name implies. To obtain all kinds of handsome if not perfect castings at a merely nominal cost of labor and at minimum expense for the material, use appropriately

Peerless Pure Plumbago

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for all kinds of castings; these materials may be brushed, dusted or rubbed on and into the moulds with the hands. Are the essential material required for Dry Sand, Core and Loam Work and Large Bells.

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The best dry lubricant extant.
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For general use is "last though not least."
No "sticking, no washing," no "running," easily "slicked," easily "peeled."

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MANUFACTURERS OF
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Graphite, Black Lead, Silver Lead or Plumbago.

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All Kinds of Foundry Supplies, Moulders Tools, Sand, Brick and Iron, Brass and Steel Foundry Equipments.

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Claiming to cure all the ills the iron craft is heir to with a uniform remedy. To obtain perfect castings or the best desired results five conditions are indispensible, these qualifications are the metal, fuel, moulding sand, moulders and facings or blackings. The latter alone are neither responsible for good nor are they to be blamed for evil results; their attributes even if they perform their functions to perfection do but assist the other factors herein mentioned. They may work perfectly in one kind of sand or under certain grades or mixtures of iron and yet often act adversely when used on another sand or under other metals that have no affinity for them. The Facings or Blackings are but one of the factors upon which are dependent satisfactory, economical or artistic castings. All these conditions being present at the same time constitute the combination known in mythology, tradition and history as "The Philosopher's Stone," a transparent and glaring humbug.

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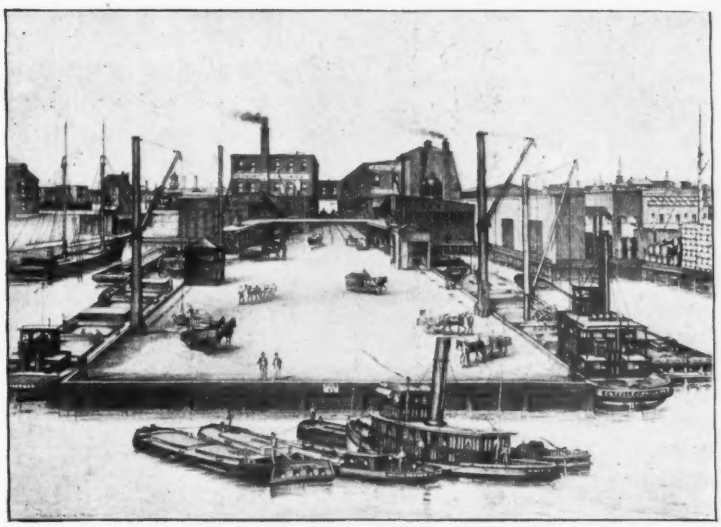

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H. P. YOUNG, PURCHASING AGENT.

Nov. 28, 1892.

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Cleveland, O.

Gentlemen:--Replying to your favor of the 18th concerning your C. F. M. Founders' Perfect Wash, I have had this matter up with Mr. Ferguson, Supt. of our foundry, and, as a result, can say that we have used the Cleveland Perfect Wash for two years, and for all purposes our foreman thinks it is the best blacking he has ever used. Yours truly,

H. P. YOUNG,
Purchasing Agent.

. . . . . .

Cleveland Facing Mills,
Cleveland, O.

Gentlemen:--We have tried your Perfect Wash and find it as its name indicates. Please ship us two barrels more, and oblige, Yours truly,

McINTOSH, SEYMOUR & CO,
Auburn, N. Y.

. . . . . .

Cleveland Facing Mills,
Cleveland, O.

Gentlemen:--Please ship 40 bbl. of your Founders' Perfect Wash, quality as last.

EDW. P. ALLIS & CO.
Milwaukee, Wis.

C. F. M. FOUNDERS' PERFECT WASH

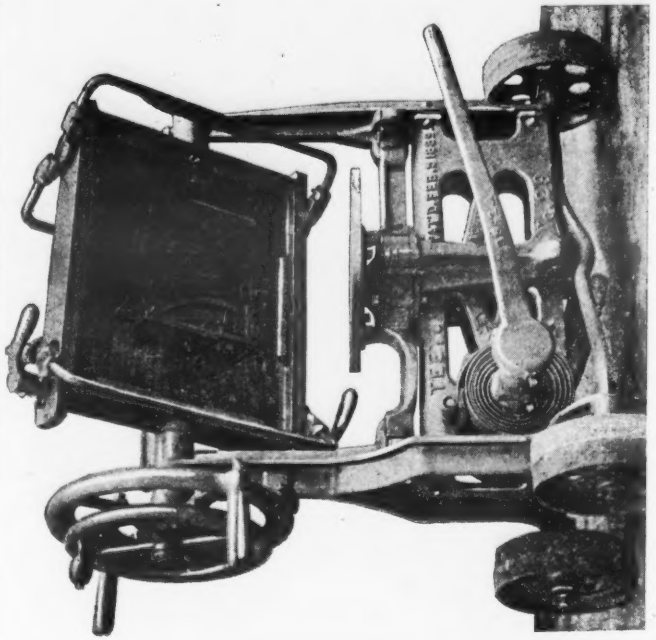
IS MADE ONLY BY

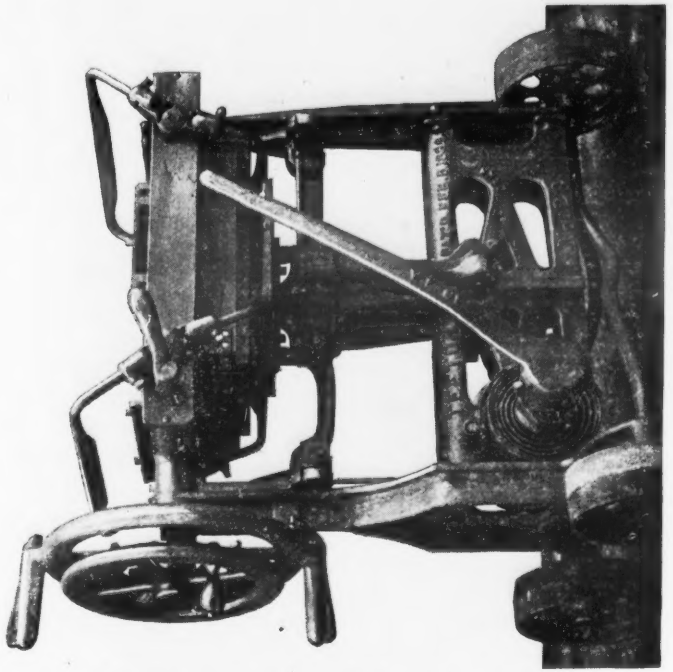
CLEVELAND FACING MILLS,

—Manufacturers of all Kinds of—

Foundry Facings, Blackings & Supplies.

CLEVELAND, OHIO.





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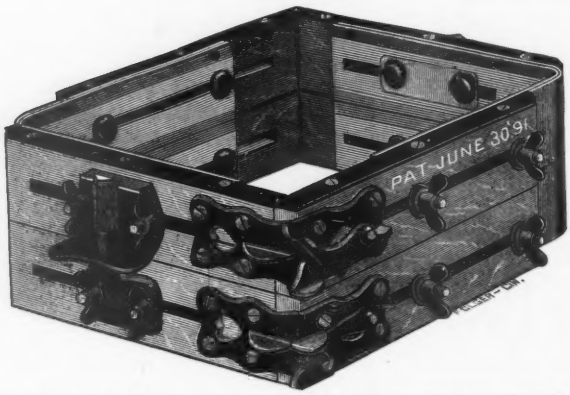
LIBERTY, UNION CO. IND.

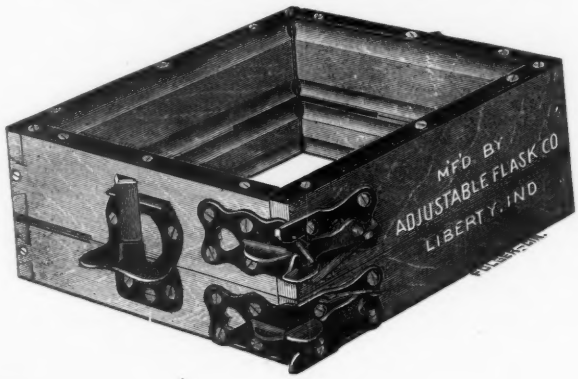
The Combination Adjustable Snap Flask.

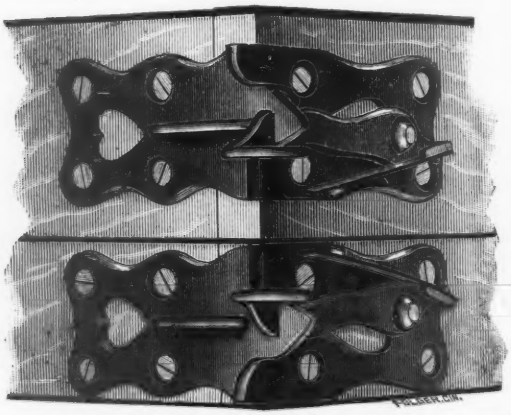


We present to you in the accompanying illustration, our new Adjustable Combination wood and metal snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or any size between, to suit patterns used. The wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. The steel pieces are the inside lining of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-S steel. It has a spring latch which makes it very easy to open and close. It is made so substantial that it will not shift or get out of order while in use. In matching drag with cope, it makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. It will suit the molder because he uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will answer the same purpose as several different sizes of the old style. The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many new ones. A three part flask is made to adjust the same as a two part.

TAPER WOOD FLASK.

Our new solid taper wood snap flask is made for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch.





AUTOMATIC LATCH.

Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order; When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

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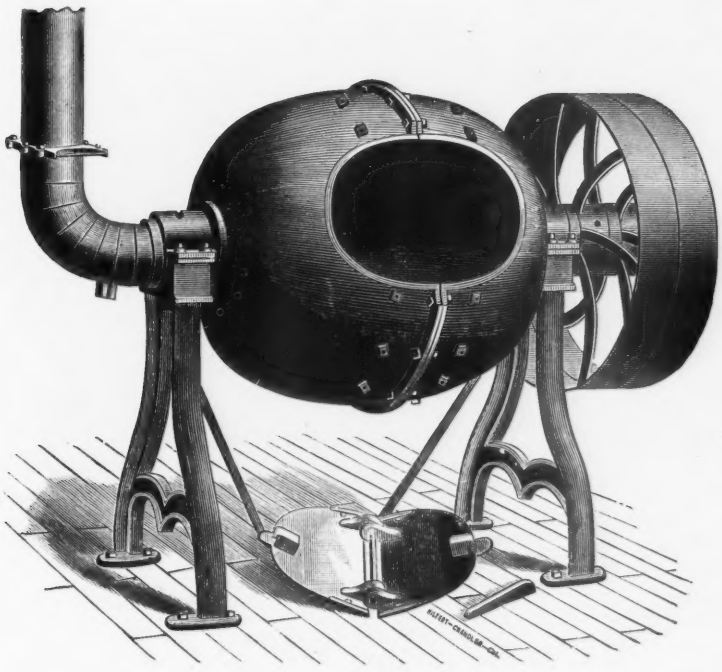
Exhaust Tumbling Barrel



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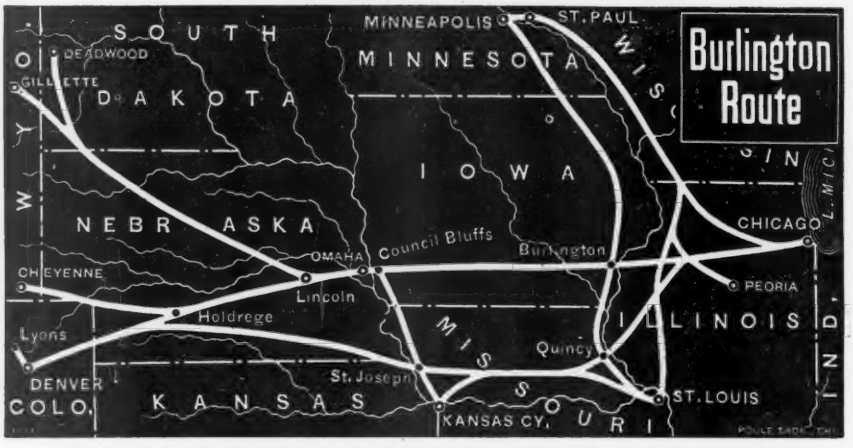

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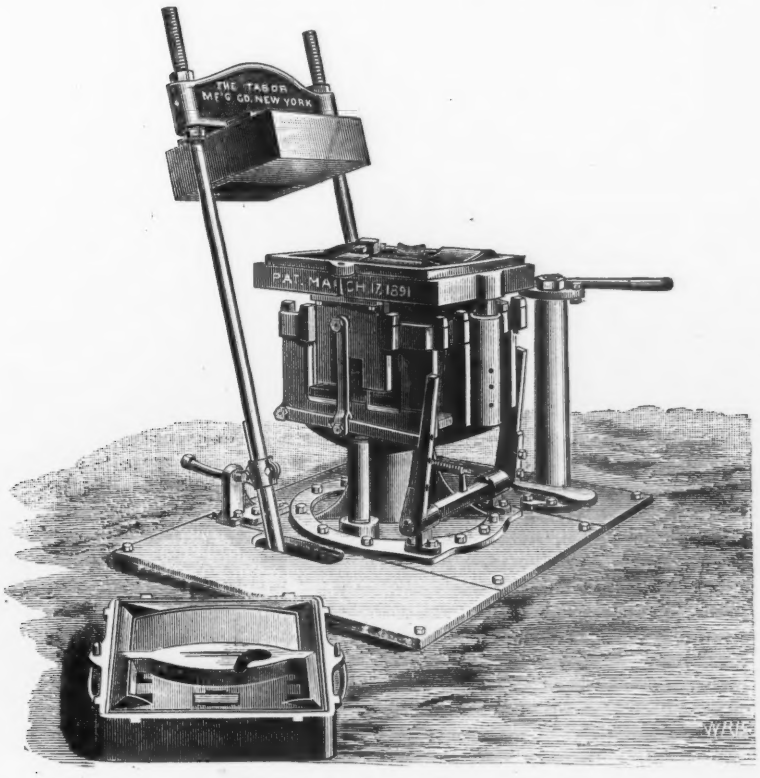

These machines are adapted to general castings when made in reasonable quantities.

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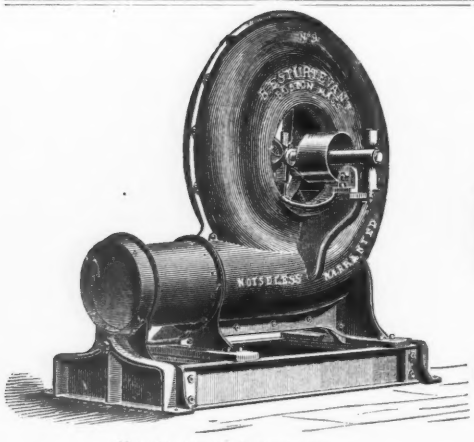

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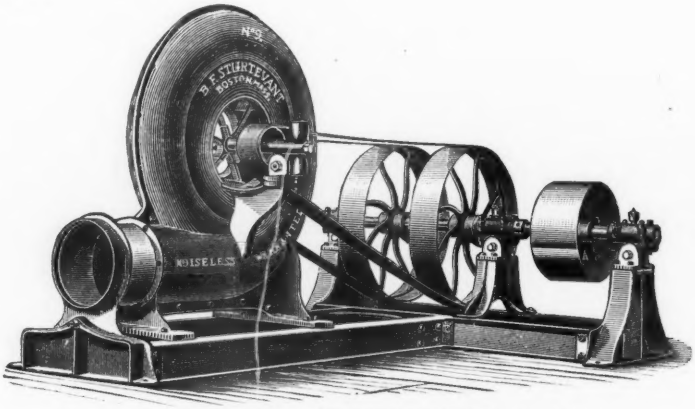

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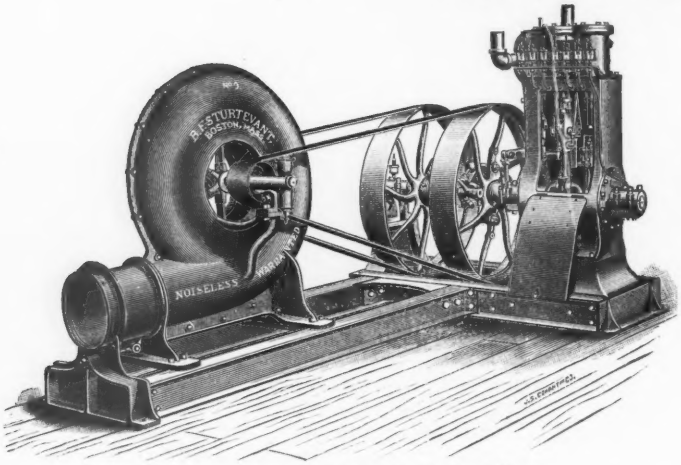

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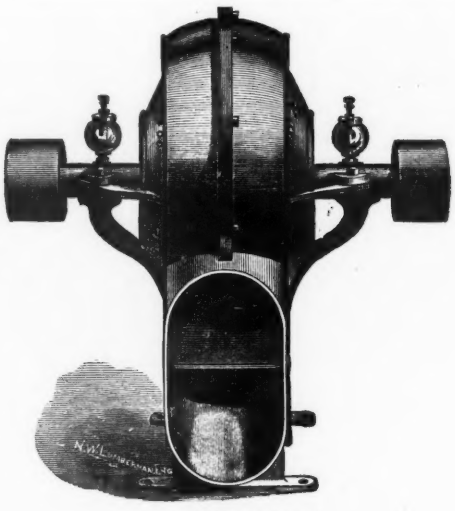

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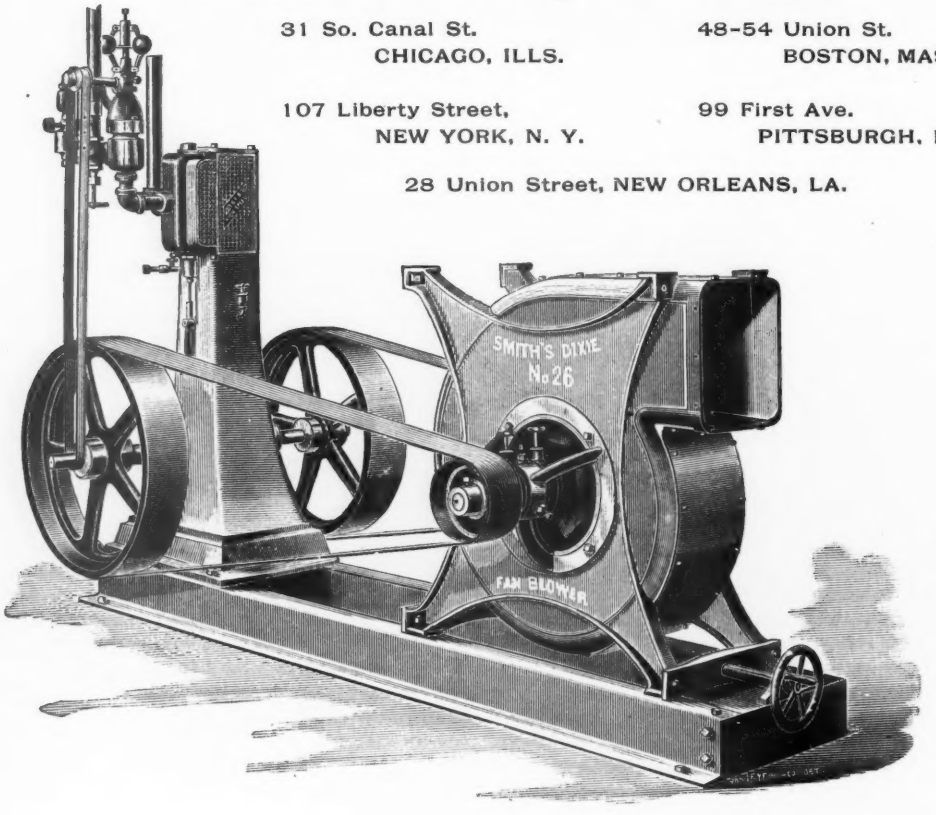

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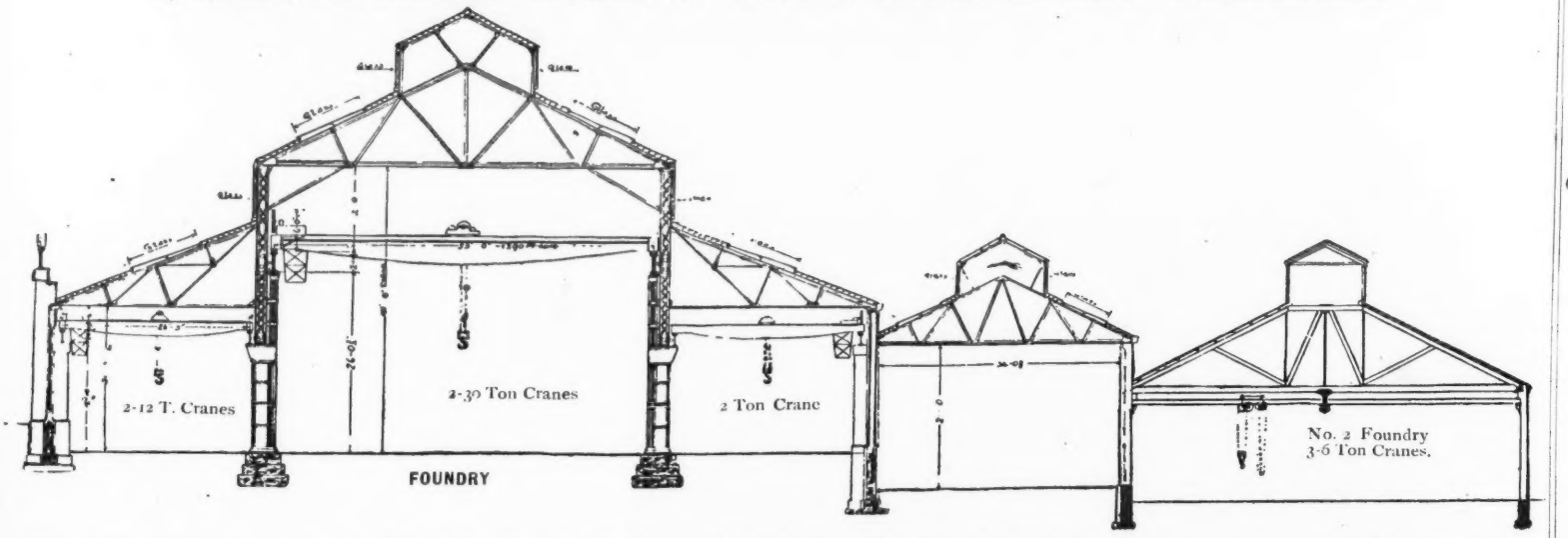

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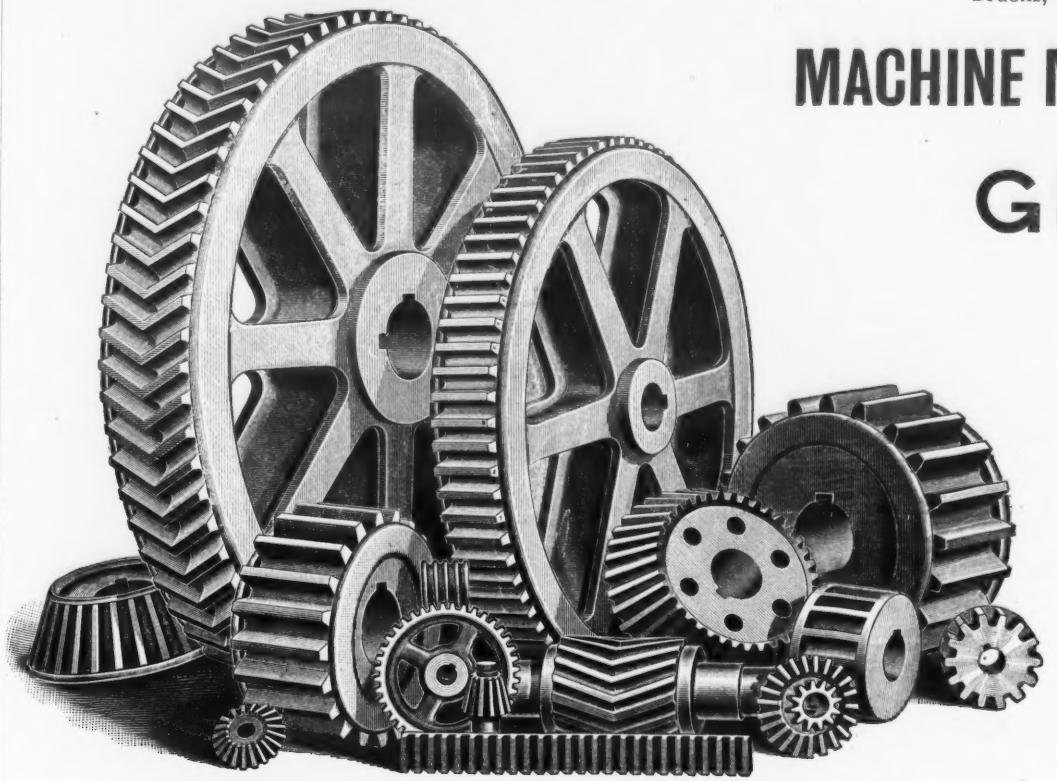

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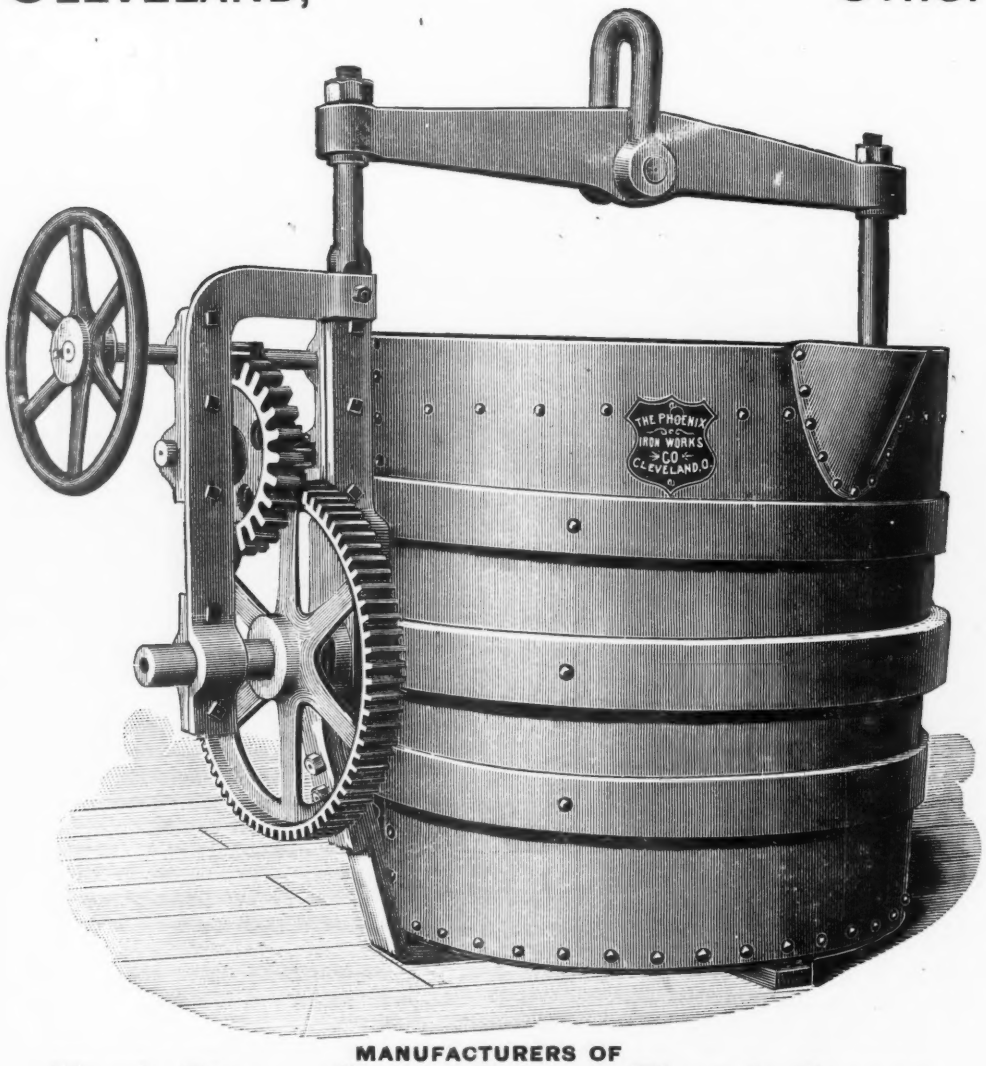

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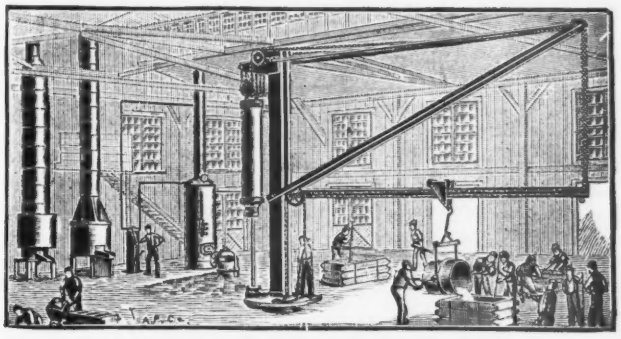

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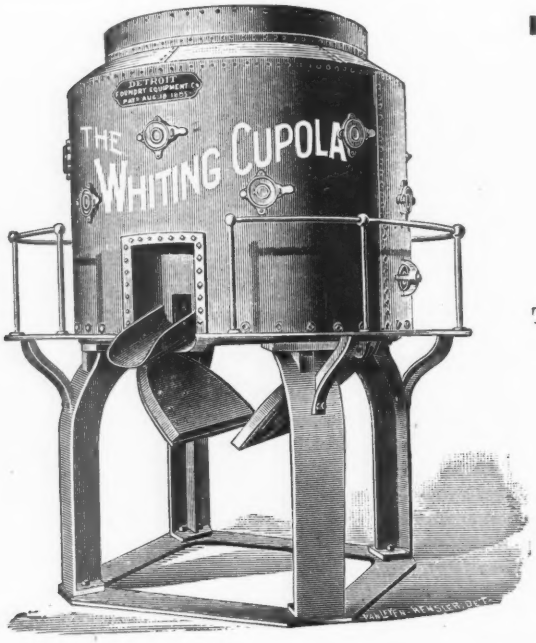

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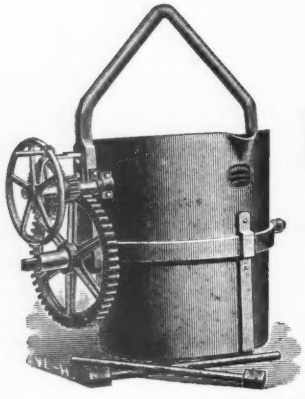

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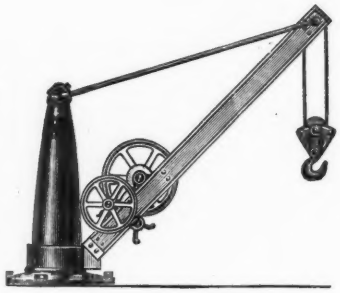

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THE FOUNDRY

VOL. 2. DETROIT, MICH , MARCH, 1893. No. 7.

STEEL MOLDING.

Written expressly for THE FOUNDRY. (Sixth Paper.)

BY JOHN PETTIGREW.

TO the men engaged in the manufacture of steel castings at the present day these papers on the early days of steel molding may seem frivolous and uncalled for, but we write them in the same spirit in which the father of history penned his thoughts. These are the researches of Herodotus of Halicarnassus which he publishes in the hope of thereby preserving from decay the rememberance of what men have done. It is from the ability in man to look back to the beginning of things apparantly small and weak or trivial in themselves that any comparison can be made in the great advancement made in any branch of human work or knowledge. When we look on the splendid castings made to-day with a fine smooth skin and perfectly solid in all their parts it makes us feel how little we did know and how dense was our darkness only a very few years ago. One of the greatest drawbacks the foundry had to contend with in these early days was the excessive porousity of steel castings, they would look all right until the skin was broken for finishing when it was found that they would be "just like a honey comb" and not only near the top of the casting but all over. For some time this was blamed entirely on the molding, the gases could not escape or the mold was not dry enough, or we had too much flour in the sand or something, anyhow the holes were there and plenty of them too, but evidently they were not shrink holes that showed in the riser or gate, but they were more like blow holes such as is caused by a mold being too hard rammed, but why should they be so all over, the bottom face of an anvil block would be as porous nearly as the top, even, although it was two feet or two feet six inches deep. After taking the greatest care with the molding for some time we came to the conclusion that it must be something in the metal itself which caused these holes and such proved to be the case. In blowing steel by the Bessemer process, I take it for granted that your readers know that the air is forced through a large quantity of liquid iron that has been run into a large vessel shaped almost like an egg, these vessels hold from five to ten tons of iron, according to size, after receiving the necessary quantity of metal laying in a side position it is turned upon end and air at a high pressure forced through the bath of liquid metal through a large number of small holes in the bottom of the vessel, this keeps the metal in a seething boiling mass, burning out the carbon and silicon contained in cast-iron when these are eliminated the vessel is turned down again on its side and after the addition of certain elements to make it of the hardness required it is poured into a ladle to distribute to the molds ready to be poured, in this state it holds a great deal of some kind of gases in suspension which causes the blow holes spoken of. But the great trouble was to get rid of these gases, and although

the castings made from steel in this state were stronger and tougher than cast iron; they were far from being satisfactory and it took a long time to find out just what would do away with these holes. We found that special heats could be blown that would make castings comparitively solid, but these would not do if cast into ingot molds for rails and sand molds for castings in the same heat, as our heats had to be used for both purposes therefore we had to trudge along on the same lines and learn from various sources the method employed and success attained elsewhere. Often in these days have we sympathized with the now celebrated Henry Bessemer when we thought of the anxieties, disappointments and heart sorrows he encountered in his long series of experiments he made just even to make the steel which we were trying to form into useful parts of machinery without the necessity of rolling or hammering it to close up all these pores which his converting process left behind, but no one man was to accomplish this, it has been the work of hundreds who almost independent of each other have been working towards this end, men in the highest ranks of science as well as others like your humble servant.

KEEP'S TEST" FOR CAST IRON.

BY W. J. KEEP, DETROIT, MICH.

Third Paper.

COMPARISON OF RESULTS BY DEAD LOAD AND IMPACT.

IF test bars that will take set are used and it is remembered that for all stresses less than the highest proof stress the bar is a perfect spring, a bar can be tested to a given stress on one machine, and then the recorder with test bar may be transferred to the other machine, and stress applied until set begins, then transfer back again and make another diagram. In this way for a given material it may be found approximately what impact is equal to a given dead load. There is no uniformity of results with different sets of bars from different materials, and the indication is that each set of bars has a dead load and impact result, dependent upon some peculiarity in the chemical or mechanical composition of such bars, and one cannot be correctly calculated from the other by any formula.

A blow is expressed in inch or foot-pounds (25 + by height of fall), but this cannot be compared with pounds avoirdupois. To be able to make a comparison, some years ago we constructed the following table (Fig. 27), which has been proved perfectly satisfactory where all results are relative.

It showes the number of inch-pounds developed by each blow. Also gives an arbitrary value to each blow in pounds avoirdupois, to allow comparison and tabulating with records from Keep's dead load machine.

Inches perpendicular fall of 25-lb. hammer.	Inch-pounds developed.	Value of each blow in lbs. avoirdupois.	Inches fall of 25-lb. hammer.	Inch-pounds developed.	Value of each blow in lbs. avoirdupois.
0.12	3.12	16.94	3.12	78.12	423.53
.25	6.25	33.88	3.25	81.25	440.47
.37	9.37	50.82	3.37	84.37	457.41
.50	12.55	67.76	3.50	87.55	474.35
.62	15 63	84.70	3.62	90.63	491.29
.75	18.70	101.65	3.75	93 70	508.24
.87	21.87	118.59	3.87	96.87	525 18
1.00	25.00	135.53	4.00	100.00	542.12
1.12	28.15	151.46	4.12	103.12	559.06
1.25	31.25	169.41	4.25	106.25	576.00
1.37	34.38	186.35	4.37	109.37	592.94
1.50	37.41	203.29	4.50	112.55	609.88
1.62	40.61	220 23	4.62	115.63	626.82
1.75	43.72	237.18	4.75	118.70	647.77
1.87	46.87	254.12	4.87	121.87	660.71
2.00	50.00	271.06	5.00	125.00	677.65
2.12	53.13	288 00	5.12	128.12	694.59
2 25	56.25	304.94	5.25	131.25	711.53
2.37	59.37	321.88	5.37	134.37	728.47
2.50	62.55	338.82	5.50	137.55	745.41
2.62	65.63	355.76	5.62	140.63	762.35
2.75	68.70	372.71	5.75	143.70	779.30
2.87	71.87	389.65	5 87	146.87	796.24
3.00	75.00	406.59	6.00	150.00	813.18

Figure 27.

The value for an inch-pound was obtained by testing a good sample of Swedish gray pig-iron which broke in the dead load machine with 288 pounds and by impact with a 2⅛-inch fall. The table was constructed from this data.

It must be observed that while the proportions of this impact machine were at first selected arbitrarily, yet it is now necessary to adhere to these proportions to make the results comparable with those which have been obtained and have been published.

EXAMPLES OF DIAGRAMS.

To illustrate what these machines will reveal, some examples of diagrams, both dead load and impact, are produced from

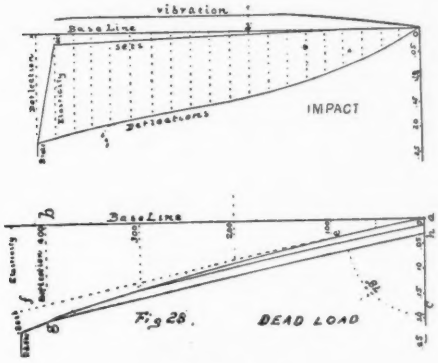

Figure 28.

cast-iron in Fig. 28, and from a rolled ½-inch bar of wrought iron (Fig. 29).

The full record of a test of pig-iron is given from our record book (Fig. 30). (Where weight or *Wt.* occurs it should be dead load, and the column *E x c*, denoting the distance from the center of

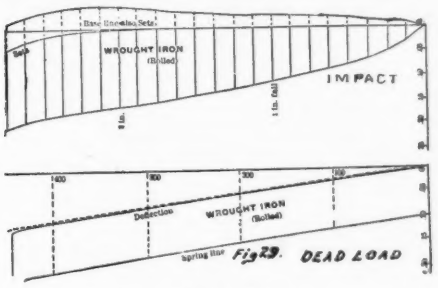

Figure 29.

the bar that fracture occurred would hereafter be filled with set.)

No. Iron	176	Poughkeepsie No1					TRANSVERSE STRENGTH			REMARKS
No. Set	SIZE h.	■ b	SHRINKAGE COLD	■ HOT	COLD—	—HOT	Tot. Av.	Def.	Fix	Fluid Shrk. Once gray per Mast Iron. Grains of gray very yellow at the chill which yellow turns to white. On other side the way of gray is chrome brown. Other side. Iron like h. split. Then grain. Edge of Purple Fracture shows that chill began on edge at 5 pm & all chilled at 6 inches. Coarse. Shrk. very slight chill at the ends of the chill mold. Mottled. Has no crust. On Cold on the cupola. A little blast steam. Work gates.
1	496	496	134	133	150	148	350	25	0	
2	499	491	135	135	149	146	350	25	0	
3	497	493	135	133	146	143	365	24	0	
4	495	496	134	134	150	148	322		0	
5	495	494	133	133	149	146	339		0	
6	500	492	137	137	148	145	329		0	
Mean	497	493	134	134	148	146	333	25	0	
Mean	497	494					333		0	
Crook	022									
Fluid	10	50								
Chill	12									
Hard										

Figure 30.

HARDNESS.

Fig. 31 represents the machine used in "Keep's test," which was invented by Professor Thomas Turner, Mason College, Birmingham, Eng., and to which we have added some improvements.

At the end of a perfectly balanced arm is fixed a standard diamond which bears upon the polished end of a test bar. By placing gram weights on the diamond until it makes a standard scratch on a standard polished surface, the number of grams on the diamond

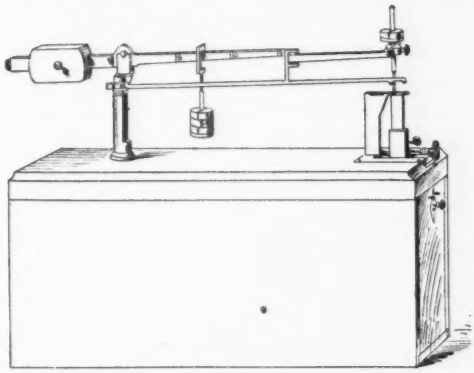

Figure 31.

point is the number which represents the hardness of the metal. Results depend largely upon the skill of the operator, but are probably more reliable than results obtained by any other method.

THE TESTING OF PIG-IRON.

Nothing can be more unsatisfactory than to melt a few hundred pounds of any one brand of pig-iron in a small cupola in contact with the large amount of fuel required, and such remelted iron is entirely unlike the average iron from a cupola after it has become hot. A furnace should be constructed something like a brass furnace, about 30 inches deep and 13 inches square on the inside, with a firebrick cover which can be easily removed. It must have a tight ash-pit, and must be driven by a fan. The blast may be taken from the same pipe that supplies a forge near by if the blast can be continuous for ten hours during the day. The pressure in the pit should be about 2¼ ounces to give best results. Use the best Connellsville coke and use a No. 16 Dixon's crucible

(brass). From five to fifteen pounds of iron will make a test, and the latter will make six or eight pairs of bars. If fifteen pounds of iron is put in in one piece it will melt in from twenty-five to forty minutes. It is well to cover the crucible with the bottom of an old crucible. If the furnace is to be run all day it is best to draw the grate bars and clean out the cinders and ashes at noon. Eight or ten heats can be made in a day, and a crucible will stand forty heats or more.

Enough sand for the whole day's work should be tempered the night before, so as never to use the hot or dried sand. Fig. 6 shows a molder at work, and Fig. 32 shows our furnace and the manner of pouring from the crucible in our testing room.* A good chimney flue must be connected with the furnace just under the cover. The work is so severe that both furnace and chimney must be securely clamped. The furnace lining will seldom last more than four or five days if used continuously. The flame comes out of all cracks, therefore no free oxygen can enter the crucible, and the cover prevents a circulation of gases in the pot.

At best there is considerable variation in duplicate casts from the same iron, but generally the test bars do not materially vary from the pig-iron. If you are mixing several brands of pig-iron in a cupola, and the results are not satisfactory, a test of each brand will generally show which iron is causing the trouble and which iron is the best.

No iron producers can deny the results of such a test. It is well to stipulate when purchasing pig-iron for thin castings that it shall have no chill when melted in this way.

To enable those who wish to aid in

* When convenient we would advise making the top of the furnace even with the floor, like a furnace in a brass shop.

the establishment of a standard test for cast-iron to be certain that their test bars and apparatus are uniform with others, if they will correspond with the author of this paper they can be supplied with the following apparatus:

1 set bronze patterns for test bars with iron follow-board.

4 pairs yokes for shrinkage and chill.

1 measuring gauge one hundred to two hundred thousandths of an inch.

1 plate for measuring shrinkage.

1 Keep's dead load testing machine.

1 recorder for dead load or impact machine.

1 one-inch micrometer caliper in box.

1 two-inch steel scale.

1 double lens, mounted.

The above is all that is needed for general foundry work. It is better to become familiar with this before purchasing the remainder of the apparatus, which consists of

1 Keep's impact testing machine.

The hardness machine or furnace castings can be made if ordered.

FOUNDING AND METALLURGY.

As Practiced in the Early Part of the Last Century.

Continued from Februarv.

Translated from Reaumur for THE FOUNDRY by N. DANTERVILLE.

I THEN sought what aid could be given to these materials and I tried to discover from what salts help could be expected. Of course, the more complicated the experiment, the more difficult to discover the cause of any particular result, and the result was much more difficult to decide on in the last of these salts than on the effect of preceding experiments. The salts, as we have seen, accomplished nothing in the way of converting iron to steel when used alone or with earthy matters, and other experiments had shown what charcoal alone would accomplish, so, taking this as a starting point, I tried the effect of different species of salts with which it is combined. I took an equal weight of each mixed with a weight of charcoal much greater than itself but equal in each creuset and in every case equal quantity of iron; afterwards making the same essays on same salts by giving them a base of soot, ashes and charcoal separately in a proportion hereafter mentioned. The effect in all cases was very similar with the following result, after many experiments. It seemed that fixed alkalies accelerated the conversion of iron to steel but nearly always rendered it a steel difficult to forge, full of cracks and almost impossible to weld. The sodas I used were Carthagena, Alicanthe, potash, etc. Other salts, such as borax, seemed to arrest rather than facilitate the effect of the charcoal, while it was doubtful if alum or green vitrol had any effect. A singular effect of other salts proved to be that the steel which was produced through their action was not durable and after being forged and tempered once had a grain nice and fine, yet when forged and tempered a second time, it was without any grain.

This singular effect was not, however, always visible and when I desired to make steel by the aid of these salts I did not always succeed, hence I concluded that these salts are not always the same. They were, sal amoniac, salt of glass, vitrol, saltpetre concentrated by tartar found by burning equal parts of tartar and saltpetre together, this last like all alkali salt produced a hard steel to forge.

It has been a drawback to steel made from forged iron that it loses its firmness in proportion as it is worked, but this is not true of all but is only true of those which owe their transformation to salts similar to those we have just spoken of. Steel made of forged iron will act nearly like that made from castings when made with like ingredients. But the most important conclusion that I drew from the experiment with salts is that I discovered beyond all doubt that the most suitable for our purpose of changing iron to a steel, fine, hard, easy to forge and one which is not weakened by the forging process, is sea-salt; mineral salt and salt from the kettles where saltpetre is refined, although of a similar nature, were never as useful as salt drawn from the waters of the sea, and while I do not say that others cannot be

used, yet with me they were not as successful. To have more accurate knowledge on this subject after having tried the effect of dry salts, I desired to make a trial with fluid salts and spirits of salts. I soaked with strong water the charcoal, with which I wished to fill a creuset, until it was reduced to a soft paste; the iron enveloped with this mixture became steel, but it only remained so until heated and tempered, a second attempt causing it to return to iron and had we desired to thoroughly reason the matter out, this experiment might give us a clue to the reason why steel made with certain salts is not as durable as it would be if made with charcoal only. I thought it unnecessary to pursue the matter farther with spirits of salts as it would not be convenient in practice to have recourse to them on account of the expense and the fear that steel made with the aid of spirits of any kind does not stand fire as well as that made by dry salts, to say nothing of the evaporation in the creusets which would be considerable. I then turned my attention to the use of some of the mineral matters which are a great aid in melting iron and which might be a great assistance in changing its tissue, some of them are well known as being excellent for certain things such as antimony, arsenic, common sulphur and verdigris, but in whatever manner they were combined I found they were only good to spoil iron or steel; the verdigris used in small quantities did not produce as bad effects as expected, it did not prevent the steel from welding which was contrary to the prejudices of the workmen who think that anything that holds a little copper would have an injurious effect upon iron. The tissue of the iron which had been surrounded with powdered charcoal mixed with some antimony was changed, but not to steel. It no longer had brilliant waves or fibres like ordinary iron, nor grains like steel, the molecules had taken a medium figure more flattened than the grains of steel and more raised than the waves of iron, they were dark while the waves in iron are brilliant.

Common sulphur used in the same proportion and with the same amount of charcoal as the preceding matters, changed soft iron to intractable iron and prevented the charcoal from having any effect on it, but when I mixed the same quantity of charcoal with a quantity of acid of sulphur, equal in weight to the sulphur which I had put in the other mixtures, the iron was changed to a coarse steel which was welded with difficulty.

To be Continued.

HISTORY OF CAST IRON.

CAST iron did not come into commercial use before 1700, when Abraham Darby, an intelligent mechanic who had taken some Dutch workmen to establish a brass foundry in Bristol, England, received the idea that iron might be substituted for brass. This his workmen did not succeed in doing, being probably too much prejudiced in favor of the metal with which they were best acquainted. A Welsh shepherd boy, named John Thomas, had some time previous to that been received by Abraham Darby into his workshop on the recommendation of a distant relative. While looking on during the experiments of the Dutch workmen, he said to Darby that he thought he "saw where they had missed it." He begged to be allowed to try, and he and Darby remained alone in the workshop all night, struggling with the refractory metal and imperfect molds. The hours passed on and daylight appeared, but neither would leave his task. Just as the morning dawned they succeeded in casting an iron pot complete. The boy entered into an agreement with Darby to serve him and keep the secret. Although enticed by offers of higher wages to leave his master, he continued faithful, and from 1709 to 1828 the family of Thomas were the confidential and valued agents of the descendants of Abraham Darby. For more than 100 years after that night, in which Thomas and his master succeeded in making an iron casting in a mold of fine sand, contained in frames and with air holes, the same process was practiced and kept secret at Coalbrook Dale with plugged keyholes and barred doors.

BIG CASTINGS IN LITTLE FOUNDRIES.

BY S. BOLLAND.

TO my certain knowledge there are no men as a class who are more ambitious of distinction in their profession than are foundry proprietors. Especially may this be said of such founders as have not the room space or power in their foundries necessary for the safe handling of heavy castings difficult to mold, owing to their great size and complexity of design.

Many and ingenious are the efforts put forth to accomplish work that at first sight strikes them as being beyond their ability to make, but on further reflection, and urged by the principle above spoken of, they have ultimately decided to make the effort; cost what it might.

Molders who have done all their molding in shops provided with every convenience for every kind of work, and whose every need and requirement has been anticipated by one or more heads that have been trained scientifically as well as practically to a thorough knowledge of founding in all its multitudinous branches, know little or nothing of the skill and perseverence practiced in the small and less favored shops to mold castings which to them would be a comparatively easy task.

When a graduate from one of the pargaon foundries undertakes to mold similiar work in the latter mentioned places, particularly if it should happen to be one of the meanest, he immediately discovers the truth of the above and metally resolves to keep his faculties on the alert; otherwise his deficiencies as a thorough molder will be at once detected. His discovery of the non-existence of conveniences and tools hitherto looked upon, by him, as indispensible for making such work almost unman him, but when upon hinting the advisability of procuring these costly adjuncts he observes the grim, far-away look on the countenances of his new shopmates, he not unfrequently retires from his new field of operations, a thoroughly disheartened man. This, of course, is decidedly wrong; a moment's reflection should convince him that the cause of his present embarassment is the natural result of his past environments, which latter, aided by his present opportunities, would, if taken advantage of, insure for him a bright and useful future.

To transport a mold or casting weighing 20 tons in a foundry more than adequately equipped with 50-ton power cranes of the latest improved patterns, is the simplest matter imaginable. How

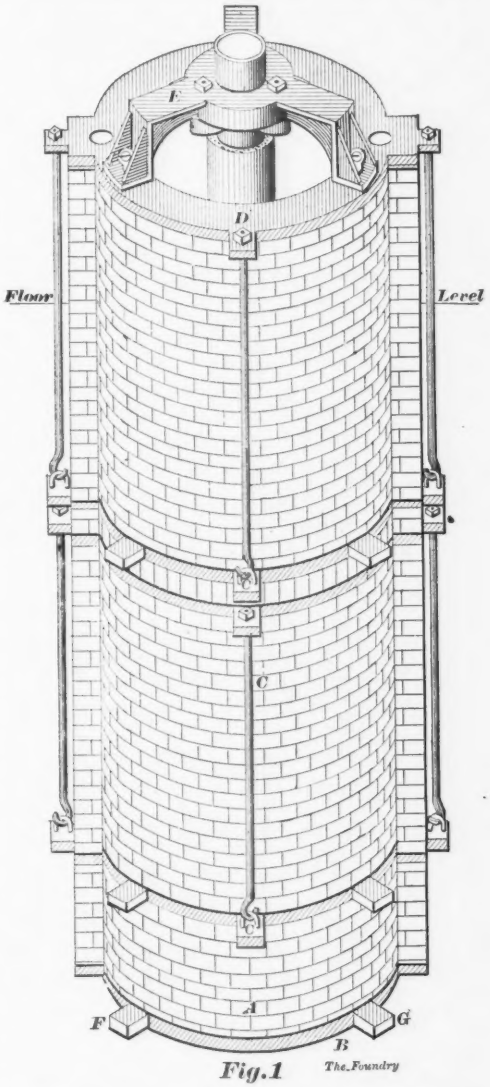

Fig. 1

such molds must be divided up, and what devices must be planned to move the same weight where the capacity of

the cranes do not exceed from 7½ to 10 tons is best known to many of the ambitious proprietors of small foundries who are every day demonstrating possibilities beyond even what we are now considering.

I am aware that the consideration of the following subject will be provocative of a smile amongst the luminaries whose effulgent light is dispensed only in the paragon shops previously spoken of, but let such be reminded that we are attempting the accomplishment of this job in a small foundry where the means are far below its legitimate requirements.

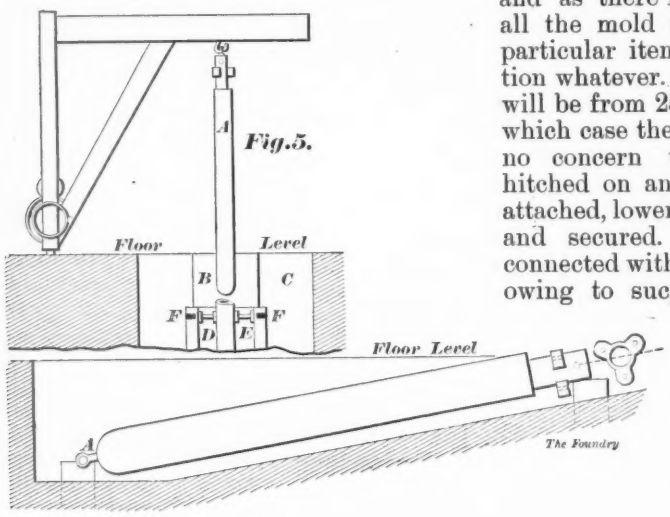

Fig.3.

Let it be required to mold a plain hydraulic cylinder 2′ 10″ outside diameter, 1′ 2″ inside diameter and 14′ 0″ long, including 2′ 0″ for head, at a foundry where every facility exists for the immediate execution of such an order. Almost certain there will be a "plug" pattern ready at hand requiring but a very slight alteration to make it suitable for the job; flasks are sure to be found in sufficient numbers to make up the required length, and in all probability a core-barrel, with or without tripod, will be found also, thus making a full rig wherewith to commence the molding of this casting on the instant of the order's reception.

Owing to the skill and foresight exercised in the management of such an establishment, the place assigned for the ramming of this class of work is separate from and independent of the regular run of crane work, and is also in direct communication, by rail or crane, with the oven; neither is there any interference with such regular work by the constant monoply of the crane attendant upon the ramming up such jobs, owing to the fact that this contingency has been anticipated and a separate crane provided for the purpose.

The exercise of due alacrity on the part of the core-maker produces core and mold simultaneously at this place in an incredibly short space of time, and as there is power sufficient to lift all the mold together if need be, that particular item requires no consideration whatever. In all probability there will be from 25 to 40 feet clear above, in which case the length of the core gives no concern whatever, being simply hitched on and suspended with tripod attached, lowered into the mold, centered and secured. Subsequent operations connected with casting and shipping are, owing to such excellent means very light events and merit no notice here.

How different is all this when we undertake to mold this cylinder in a shop 50 feet square, having cranes capable of lifting only 10 tons with a height from floor to crane hook of 12½ ft. and without either pattern, flask or core-barrel wherewith to make the job. Under circumstances of this nature we must either incur the expense of new patterns and flasks or go back to the time-honored practice of "making it in loam," the latter method is what we propose to explain as we proceed.

In the first place this casting will weigh about 16½ tons, this, of course, necessitates the division of the metal, for pouring with, into at least two portions, each of which must be less than 10 tons, the latter weight being the limit of the crane's capacity.

Next, there must be such a separation of the copes forming the outside of the mold as will permit the core to be inserted at about midway of its length,

the remaining portion to be lowered over the core subsequently. Another important item in the general arrangement is to place the lower part of the mold into the pit at such depth as will allow the core, when suspended, to swing clear of it, and as the core, exclusive of lifting tackle is about 14′ 6″ long it must, of necessity, travel in a trench dug in the floor from the point where it has been suspended to the pit. The labor of digging this trench will naturally suggest the keeping of these two points as near together as is consistent with safety.

As before stated, when there is unlimited height, the core, with its necessary appendage can be lowered down into its place after the outside has been all set, this allows the core to swing from the tripod clear of the mold during the operations of closing; but in this instance the core, owing to the altered circumstances, must first find a resting place at the bottom of the mold, until the remaining part of the mold has been closed over, after which the tripod can be attached and the core freed from its temporary anchorage.

For the benefit of molders whose experience has not embraced this particular phase of the trade, I shall by the aid of the accompanying illustrations, endeavor to make plain how best to mold such a job in loam where the conditions for doing so are about equal to those related above. A glance at Fig. 1 will give a good general idea of the whole apparatus required for constructing the mold, the other figures will be found useful and aid the mind in arriving at an accurate knowledge of its numerous details.

We will first consider the mold proper which consists of lower section A, that is seen to be built upon a stout foundation plate, B, of such form and dimensions as will permit a double course of bricks beyond a suitable thickness of loam. Provision is also made for building in a system of running gates down opposite sides of the mold. The form of this foundation plate, as well as all cope and binding rings used on the job may be seen at A, Fig. 2, that being a plan view of the top of the mold, exposing top binding plate tripod, and one runner basin, the latter being purposly drawn out of place in order that a sectional elevation of the same with its connections lower down could be obtained, as seen.

How much of the mold is contained in this lower section will be seen at a glance by referring to B, Fig. 2; the bottom connection of one of the running gates spoken of is shown at C, the opposite one, not shown here, must be taken for granted. A tapered iron block 4″ square on its upper surface is to be built in, as seen at D, for reasons that will be made clear as we proceed. The two upper sections of coke may be built separately, closed together when green, finished and marked with guides for final closing and then blackened and dried separately.

To meet all the conditions previously laid down, it is necessary to make an equal division of the copes above the bottom section, this makes them about 6′ 3″ each in length, and in order to give the requisite strength to the structure, it is important that each cope be bound together as seen, the principle of binding being to cast four additional lugs, with staples on each cope ring as shown at C, C, Fig. 1, by this means the upper binding ring can be drawn down firmly and thus make of the whole courses of brick one unyielding fabric.

The upper cope is a fac-simile of the one described, excepting that instead of placing the binding ring one course of bricks below the joint as in the lower, it is, in the higher, placed on the top course of bricks with its smooth side uppermost, this gives a better surface for the tripod E, to rest upon.

The core barrel, 10″ diameter outside and 1″ thick, in this case need not be over elaborate, nor possess any element of fitting beyond the capacity of the ordinary foundry blacksmith; a careful examination of Fig. 2 will explain all its parts, internal and external. Three lugs, with holes for bolts, are to be cast on 8″ from the top, as shown in all the figures, and midway betwixt these lugs and the top, a hole 2½″ diameter, must be cast on opposite sides through which a 2″ steel bolt pin can be inserted for

the purpose of suspending the core for closing, as seen at Fig's. 3 and 5.

The gudgeon A, Fig. 3, $2\frac{1}{2}$ diameter, is purposely provided with an eye for lifting by, but must be screwed out when the core has been suspended, as seen at Fig. 5, and replaced with the one shown at E, Fig. 2. The object of the latter plug is two-fold, at first it is screwed exactly even with the bottom of the core and forms a sure rest, independent of the loam on the barrel, the full value of which arrangement will be apparent when the test of its merits are exhibited further on.

At F, E, Fig. 2, are shown plan and projected elevation of the tripod to be used on this occasion for the final suspension of the core. As seen, it consists of three legs or stands, connected by a stout central ring which encircles the core-barrel; three holes, corresponding to the position of the holes in the lugs, are cast in the central ring for bolts G to pass through. The height of these lugs on the barrel determines the depth

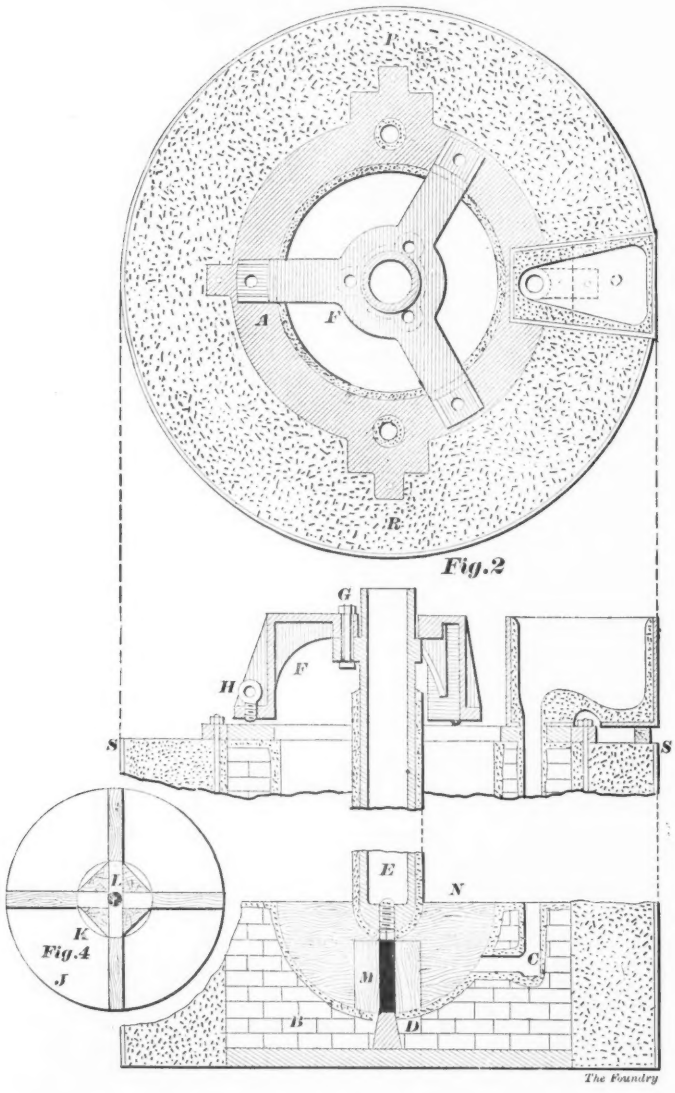

Fig.2

Fig.4

of the tripod, and it is always advantageous to allow for a steel bearing about 1″ thick to rest upon the top ring for the screws, H, to work upon.

Before commencing to close this mold let me draw attention to the cross or cradle, shown at Fig. 4, and explain its use. It is composed of two half circular boards 2″ thick, halved in the center and strengthened by four corner pieces, as seen. The outer circle at J, corresponds to the curve at the bottom of the mold, whilst the curve at K answers to that of the core. An iron pin, L, 2½″ diameter, is let into and extends through the cross, this pin as seen again at M, Fig. 2, stands flush at both ends, the lower end resting upon the stud or block D, whilst the upper forms an immovable support for the core, the whole weight of which is carried by the screwed plug, E, previously spoken of.

This cross, as will be plainly seen at N, Fig. 2, forms a cradle which fits the molds exactly and gives a central guide for the core, the bearing for which is by this contrivance, a direct connection of the barrel with the foundation plate irrespective and independent of either the mold or core.

When this cradle has been set into the bottom section of the mold, lift on the lower piece of cope and proceed to swing the core. As stated at the outset, this can only be done by lowering the bottom end as much into the floor as is lacking in height of crane for effecting a clear swing. Fig. 3 shows the core resting, at each end, in a trench dug for this purpose, and Fig. 5 is a rough representation of the core, A, swinging in the crane and issuing from the trench, B, over the mold in pit, C.

In this case the trench would require to be about 3 feet deep; the lower cope standing at that distance below the floor line, as shown, would bring the top of the mold, when all is closed, about 3′ 6″ above.

When the core has been lowered into the guide below and centered by packings which must be firmly wedged at three or four places round, take care that each packing is placed opposite the binding ring as shown at F, F, Fig. 5. It will here be seen why we make these copes so strong, the binding ring serves the double duty of keeping the mold in good shape and acting as a firm buttress against which to steady the core until the upper cope has been placed, when, if the core is found to be correct at that point also, the work may be continued, but if it should be found necessary to move the core over a little at the top, then loosen the lower braces and proceed to pack above as before, using the inner edge of the top binding ring as a buttress.

The tripod may now be lowered over the barrel and made fast thereto, after which bring the set screws, H, Fig. 2, firmly down on the steel packings until the tripod bears the whole weight of the core. If this is done carefully there will be no further centering to be done.

The whole mold, exclusive of the bottom section, is to be now lifted in order to take out the cradle, N, and make good the bottom of the core, but before proceeding to do the latter, let the plug, E, Fig. 2, be screwed ½″ further in, this will permit a covering of loam at that part and prevent damage from the molten iron.

By placing a runner basin, O, Fig. 2, at each of the down pouring gates P and R, we obtain a correct plan view of the top of such a mold when the outside has been rammed level with the top, as seen at S S, which point, as before stated, stands about 3′ 10″ above the floor line.

For obvious reasons I have omitted showing the cross and slings used for binding purposes, but it is well to say that there must be no bungling here, as there is an upward pressure under this core of about 3½ tons. Use a good cross and let the packings come directly over the ends of each wing of the tripod.

Granted that the conditions for melting iron in this shop are about equal with the majority of our small foundries and remembering the weight of this casting we cannot, conscientiously, withhold our need of praise for all such founders as can successfully produce such work creditably under circumstances so adverse.

Subscribe for THE FOUNDRY, $1.50 a year.

STOVE PATTERNS.

BY C. D. PEET.

FROM the remote and dim vista of the past when our pre-historic fathers toasted their aboriginal shins at the camp-fire until this enlightened age of electric progress, the problem of the proper cooking of our meals and warming of our bodies has been discussed.

Plans have been adopted and rejected, patents have been issued, (and infringed upon) ideas have been suggested (and stolen) and indeed, it is a wonder that a revolution has not transpired long ago in stove manufacture since there have been so many so-called improvements.

A German heating stove is an institution fearful and wonderful to behold. Built of enormous tiles, it lifts its gigantic height from floor to dome. Our Teutonic friends have a no inconsiderable advantage over us there, for, with a small fire-box and enormous radiating surface, there is comparatively little fuel wasted.

The Dutch oven and the ancient spit are other examples of primitive methods, some of which are still in vogue.

Perhaps the greatest improvement made in stoves has been made from an artistic stand-point within the last decade. The first abortive attempts at ornamentation consisted of a very simple and oft times an exceedingly ugly design which was speedily rejected when wide awake manufacturers realized that the trade demanded something ornamental as well as useful.

This brought into the market an entirely different class of goods, some of which are superb works of art with nickel and bronze trimmings and statues, mica doors, fancy tile panels and a host of other beautiful and a sthetic improvements.

The principal theories of cooking and heating, however, have been adhered to by wise manufacturers, only a few being misled by false and ridiculous notions.

But, as the stove was to be regarded in the future as a beautiful piece of furniture, it became necessary for manufacturers to devise some means to produce fine, smooth castings.

The first efforts to obtain the desired results were by the aid of facings which permitted the "returning" or printing back of the pattern.

In a previous article I treated in a brief manner on the uses and abuses of foundry facings, or, as frequently styled, dusts, and although the subject was by no means exhausted, enough was written for the proper understanding of the very important matter of smoother castings. But no matter how perfectly the facing may be adapted to the purpose intended, good results cannot be secured unless the pattern is in good order.

To draw a comparison which will make the matter plainer to the average thinker, let us compare the art (for it is an art) of molding to its kindred, "art preservative of art," printing, which requires essentially three similar elements, type, ink and paper.

If we may assume that the facing treated upon in the previous article, represents the ink, let us consider the pattern, in the light of printing type. The ink may be of the very best quality, but if the type is imperfect the result will be unsatisfactory, no matter what quality of paper is used, hence, the triple alliance of facing, sand and pattern must be perfect to insure success, with, perhaps this advantage, that the pattern and sand can endure the want of intelligent use more than the facing, since the latter is frequently the victim of a molder's caprice or his mistake in sometimes getting the cart before the horse, using more or less of the heavy or return facing than is required.

The proper care of patterns consists as far as the molding floor is concerned in keeping them clean and well waxed, and of all places the molding floor is least adapted to that end, for it is filled with corrosive vapors which, when the temperature falls, condenses upon the patterns, giving them a substantial coat of rust. When in this condition the more perfect the dust, which is to receive the impression in the operation of "returning" or printing back, the more plainly will the small protruding points of oxide make their mark.

It is not necessary to enlarge on the chemical process involved in the formation.

The sesquioxide of iron on the sur-

face of a nicely filled pattern, furnish the conditions and it will "get there just the same," and whether called dirt, oxide or sesquioxide, the result will be the same.

There is but one sensible way to remove it and that is by the liberal use of No. 3 sand paper and elbow-grease, but since "an ounce of prevention is better than a pound of cure" it is customary in all well-regulated shops to remove the patterns when the molder is through with them, to a heated room. Boys are frequently employed for that purpose and it has been found to pay.

The operation of waxing patterns varies in different localities. Some founders cut the wax with spirits of turpentine and paint the pattern with the solution, but it will be apparent that this coating is but superficial and is a poor protection.

It is best to heat the pattern in a suitable iron box or over a fire, to the temperature of about a hundred degrees, touching the pattern with a lump of pure bay-berry or bees-wax, which will flow over it freely, the operation assisted by a soft brush.

Paraffine is prepared by some founders, it having more resisting power and less affected by acids than wax, but it is not at all adapted to filling crevices and holes as it does not incorporate with itself as does the former.

Every careful molder will brush his patterns all over every morning with a stiff brush before commencing his day's work as it materially aids him all day in making clear and effective print.

The breakage of patterns in every large stove foundry is no inconsiderable item, many of them keeping a corps of expert filers solely to repair broken patterns. Their wages, the time lost, the inconvenience resulting from the delay before they can be returned to the foundry, the no inconsiderable weight added to a set of patched patterns, all foot up in the end an astonishing item of expense.

Patterns average from one to three thousand dollars per stove complete and new styles come in every year. Indeed the stove is hardly out of the sand when the patterns will be relegated to the pattern-loft to make room for some new style, or to the fitting room to be revamped into a new and attractive design by the addition of more modern artistic features.

IRON IN BUILDINGS.

IN view of the growing application of iron of various kinds in building construction, it may not be uninteresting, a well known architect thinks, to recall a number of practical German experiments which were prompted some time ago by the fall, during a fire, of the upper stories of a building in Berlin owing to the collapse of some pillars of cast iron. After the accident the Prussian police commissioners issued an edict forbidding the use of columns of that metal, but permitting the utilization of pillars of wrought iron. Cast iron, it was ordained, should only be used where the support was surrounded by a casing of sheet iron in such a manner that there was a good air space between the two classes of metal. This promulgation, as might have been expected, provoked much criticism and opposition; and several authorities, not only reasoned against it, but they conducted tests, as already intimated, to disprove the assumption on which it was based. A long series of trials was carried out at Munich with columns of both cast and wrought iron. They were loaded with weights approximating to those used in buildings, and were heated first to 300° Cent., then to 600°, and finally to red heat, and jets of cold water were ultimately played upon them, exactly as would have been the case in an actual conflagration. The result showed that although the cast iron pillars were severely damaged and cracked by their treatment, they continued to sustain their loads quite safely; while those of wrought iron were not only much bent before even a red heat was attained, but they so twisted when cold water was poured upon them that they could not support their burden. The conclusion naturally drawn from these experiments was that cast iron is really much safer than wrought iron for buildings. Columns of other materials, such as ordinary stone, brick and concrete, were also tested. Of these, concrete yielded the

best results, withstanding a fire of three hours' duration. Pillars of common brick likewise stood well: but granite, sandstone, etc., evinced inferior resisting power.—Ex.

We have just received a very elegant catalogue from the Reynolds M'f'g. Co., New Haven, Conn., which illustrates and explains in detail the large line of molding machines manufactured by them. While this catalogue is deserving of especial mention from its neatness and beauty there is one thing about it which can not fail to strike the close observer and that is the long list of well known American foundries who are extensive users of these machines, several have over a hundred in use while one large foundry concern with branches in four different cities uses 787.

An explosion in connection with the cupola at Osborne & Co.'s foundry at Auburn, N. Y., Feb. 20, injured 5 men.

NEW YORK AND VICINITY.

The N. Y. Metallic Bedstead Co., have commenced work in their new foundry at Pacific avenue, Jersey City, N. J. The company started with a capital stock $100,000; Mr. C. Stuart Bailey Superintendent. Their building is a substantial frame structure 200x100′. The main entrance is at the eastern end, within 100 yards of the tracks of the Newark branch of the Central railroad of New Jersey. The plans were made with a view of avoiding all unnecessary rehandling of the raw or finished material. All the supplies for the brass and iron departments can be brought into the yard or foundry before unloading from the cars by using a switch, connecting the tracks of the C. R. of N. J. with tracks that extend to the center of building. The metal will be supplied from a Whiting cupola. It is calculated that the brass and iron foundries will have capacity for turning out the castings for 100 bedsteads daily.

Messrs. Carrere & Haas, (successors to Howell & Saxton) at Park and Hudson avenues, Brooklyn, N. Y., have done considerable cleaning around their place during the past two months. Mr. J. W. Hamilton the outside superintendent and Mr. P. P. Thomas the foundry foreman, feel confident of their ability to handle some of the big architectural jobs that are in the market this spring. During the season just closing they completed the iron work for the Rothchilde building at Fulton and Jay streets, Brooklyn, N. Y. It has 10 stories, basement and cellar.

The Thompson & Bushnell Co. have leased and put in operation the foundry formerly occupied by the Washburn & Hunt Car Wheel Co., at Warren and Bay streets, Jersey City, N. J. They have thoroughly refitted the shop and have splendid facilities for doing a good business in the jobbing line in addition to their regular work, which is steam specialties, shaking, interlocking and sectional grate bars. Mr. Sidney Williams is superintendent. He has had considerable experience as foreman in different jobbing foundries in Jersey City and other parts of the country. Mr. C. M. Smith will look after the outside end of the business.

At the Wheeler Condenser & Engineering Company's foundry, Carteret, N. J., the loam department is doing a good business. The most important castings made there recently were two cylinders (one high and one low-pressure) for a double compound incline engine, that the W. & A. Fletcher Co., Weehawken, N. J., is building for a new steamship for the Fall River Line. The low pressure cylinder is 95¼″ bore, 11′ stroke, 14′2½″ long, weight of clean casting 24 tons. A reservoir with capacity for 13 tons of metal and two ladles, one 10 and the other 7 tons capacity were used to cast it. A number of representatives of the New York press and other gentlemen interested in the science of modern iron founding were present when the casting was done. They were well pleased with the exhibition given under the direction of Mr. Peter Finegan, foreman, and Mr. John Laurie, assistant foreman. The high pressure cylinder is 51″ bore, weight 16 tons.

Messrs. Ryberg & Smith have succeeded Gustav Koerner in the brass foundry business at 116 Hope street, Brooklyn, E. D. They make castings in brass composition German silver and zinc.

THE FOUNDRY

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SHOULD BE LET ALONE.

IN our issue of February 10th we called the attention of the foundry world to a well-advertised swindle called alluminum alloy, being placed on the market by a concern called the Hartsfield Furnace & Refining Company of Newport, Ky. Since then we h ve received several letters from different sections of the country all indorsing what we had previou ly said and judging from their contents both the firm and their mythical alloy should be given a wide berth by foundrymen everywhere. Under date of February 23rd the *American Machinst* devotes over a column to the illustration of the dishonest methods of doing business practiced by these same people in copying a letter from their columns, altering it to suit themselves and publishing the altered extract as an indorsement of their alloy from the columns of that widely known periodical. As the commercial agencies do not report them as being responsible at all, any legal proceedings would be unavailing and our only hope is that we may be the humble means of preventing their nefarious methods from enabling them to dupe honorable people.

CO-OPERATION THAT CO-OPERATES.

WHILE the industrial atmosphere during the past year was more than usually heavily charged with the germs of a universal discontent on the part of the wage-worker, and while the theorist and statistican were accumulating and publishing volumes of evidence (?) with a view of proving that the only sure cure of the labor problem lay in the eradication of America's labor organizations backed up the publication of numerous one-sided and unfair articles in the columns of those papers, periodicals and trade journals, etc., that make a specialty of catering to the manufacturing class, there was being put into practical operation in many parts of America in the most unobtrusive yet efficacious manner, a system that if more commonly adopted by our large manufacturers and employers of labor, would put an end to these awful destructive and ruinous disputes between employers and employees. We refer to the subject of profit-sharing which a few years ago received some consideration from an intelligent public, but was not received with much popular favor owing to an extreme diffidence on the part of the majority of em-

ployers to do any *sharing* except with themselves.

The system is, however, growing in favor and every year brings fresh adherents to what THE FOUNDRY believes is under all the circumstances the shortest road to an amicable settlement of a question which has received more or less attention from every legislative body in the land, from the United States Senate down, and that has made its influence felt in no uncertain way in the mind of every thinking man and woman.

The great flouring mills of the Pillsbury Company, at Minneapolis, Minn., the Illinois Steel Co., Joliet, Ill., one of the largest producers of iron and steel in the country and numerous small enterpises to take their employees into partnership on a small scale and according to a well-defined and carefully digested plan. In Pittsburgh the well-known firm of H. R. Potter & Co., locomotive builders, have had the plan in operation for eight years and a few weeks ago the eighth voluntary distribution of profits took place, the plan being, we believe, a simple pro rata division of the profits in proportion to the salary of each individual. A letter addressed to each employee contained the following:

"We are especially gratified that the amount distributed is not decreased, as we supposed it would have to be. The conditions of business the past year have been very trying, and in many respects discouraging. Prices were less throughout the year than in 1891, and the output for the first 6 months was very small. But as soon as the demand increased the output largely increased, and by your efficient co operation, as soon as you had the opportunity to put it forth, we largely recovered the lost ground. This proves to us what we believed before, that practical co-operation is a positive benefit to every one of us, and that it pays us partly, if not fully, in the item of dollars and cents, to make this distribution. We have often said to you that it is only on this basis that we can hope to make such distribution a permanent annual thing. But such reasonable return to us only makes us the more gratified to recognize your efficient and cheerful service, and to be able to give you this additional remuneration for your faithful labor. We hope that in receiving this sum, each one of you is conscious of having deserved it by having rendered the best service in his power; and that the money will be a positive good to each one, and to all dependent upon you."

It is easy, of course, to understand why there are no labor troubles in that establishment and why it is that the firm believe that they get more than they distribute in the increased efficiency of faithfulness and energy of the employees. In Dolgeville, N. Y., at the large felt manufacturing plant of Alfred Dolge the same system is in operation and on a recent occasion when the annual distribution of profits took place Mr. Dolge in his speech stated that he became more convinced as year after year passed by that this was the only system whereby justice could be done to all alike. A sum equal to 16⅔ per cent. of the total wages of this establishment was last year distributed and it was the most prosperous year they had ever had in all departments, being behind in their orders in spite of all efforts to keep up.

COMPLIMENTARY.

ON another page we have reproduced a couple of letters that we have selected from a large number received in this office and which are somewhat flattering, as showing that our advertising columns are appreciated by those who have patronized them.

MORE IMPROVEMENTS.

COMMENCING with March 1st, the subscription price of THE FOUNDRY was raised to $1.50 for single subscriptions and $1.25 where eight or more send in their names together. This has been rendered necessary by our having enlarged it and because other improvements are in contemplation, among them being the use of a finely finished quality of heavy book-paper and the addition in the very near future of several pages which will make it by far the best trade paper, considering its age and price, in the country.

AGENTS WANTED.

WE want a few hustling, reliable men to act as agents for THE FOUNDRY and are prepared to offer a liberal commission to the right parties.

This paper is one that takes wherever foundrymen are to be found; it aims to occupy and satisfactorily fill a field long neglected, and it would not be possible to find anything in that line that meets with a more ready welcome or from which our enterprising agents could derive greater profits. There are still several sections of the country unrepresented and we want a good man in every town and city immediately.

WE MAKE A SUGGESTION.

WHILE it is not the policy of THE FOUNDRY to devote any attention whatever to labor matters, and while we propose to remain for the present entirely indifferent to anything that may or may not be done by any of the labor organizations that contain within their ranks any of the iron molders of the country, yet as we have upon our books hundreds, if not thousands of names of subscribers, both employers and employees, who take from a strictly business point of view, considerable interest in the condition of affairs at all times, we feel as if we might be pardoned for this digression under the circumstances.

There are two organizations, one very large and powerful, the other not so influential, that claim under varying conditions the allegiance of the iron molders of the country. A rivalry that has grown gradually in its intensity to jealousy and hatred and which has caused much bitterness not only among themselves but between them and their employers and because a proprietor employs a man who belonged to a different organization to the rest of those in his employ, conflicts have at times arisen which have brought about unpleasant results between employers and employees, especially the latter. Looking over the situation, as it appears to one strictly impartial though well informed, it appears more than certain that it will be entirely impossible owing to natural conditions to ever weld these two bodies together because there exists and always will exist, a feeling in a certain branch of the business that it is unjust to all parties to have them all together. It seems, therefore, to us, and we only offer the advice in the interest of harmony and good feeling, that if some plan could be adopted whereby pleasant relations could be established much could be gained.

With organization in the abstract or as a theory, THE FOUNDRY is a believer, although it must be confessed that in many, if not in the majority of instances, when labor organizations see fit to show their hand, they mistake and leave their members worse off than they were before, but in this case as organizations are bound to exist we suggest that they follow the example so liberally set them on all sides and "get together." So long as the feeling we have before referred to remains there will never be harmony and without it nothing can be done. There is a divided sentiment about having all in one society which must be catered to and employers are as sick as employees at being compelled to regard a man as a mechanic when he has no claim to the title because to be a mechanic and a good one is an honorable title.

Much more might be written on this subject but we have already overstepped the limit we originally set for ourselves, we make the suggestion and it is going to be adopted sooner or later; if not, the molders' organizations will remain a curse to those who compose them and their employers.

I believe your magazine to be a very useful one, and the only fault I have is, that it does not come often enough. Will do all I can to extend its circulation. D. C. DEMOREST,
Proprietor Altaville Iron Works.

NOTICE.

We are very anxious to secure at least, thirty copies of THE FOUNDRY for the month of January, last, and will pay 25 cents each for them, and trust that those of our frienes who can favor us will do so.

CUSTOMER—"That 'boy's tool chest' I bought of you was a fraud. The tools didn't last a a week."

DEALER—"You must have been using them yourself."

"Of course."

"Those tools were intended for boys, not men. They would have lasted your boy a year, at least."

"I handled them more carefully than a boy would."

"No doubt. But you used them a week. A boy would have tired of them in two days and a half."—*Boston Globe.*

After reading THE FOUNDRY we have concluded we would become subscribers for a year and herewith inclose you amount of subscription. KINGSLAND & DOUGLAS M'F'G. CO.,
St. Louis, Mo.

I think it is a good thing for all foundrymen.

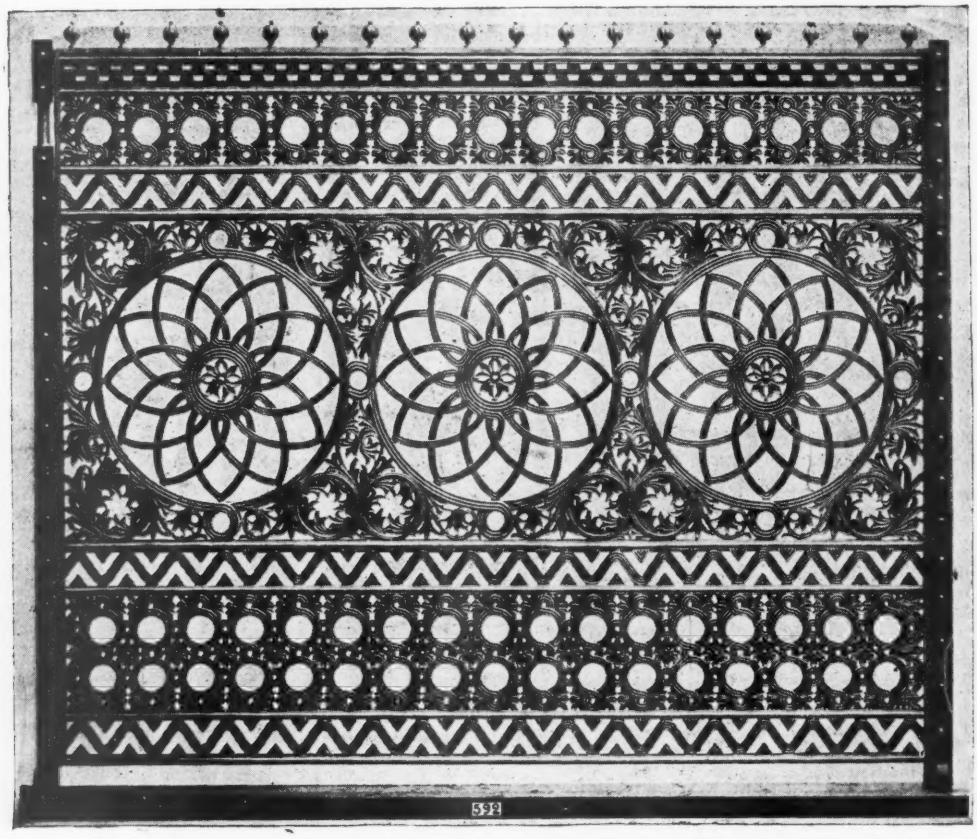
J. L. AENCHBACHER, Aenchbacher Bros.,
Atlanta, Ga.

ORNAMENTAL IRON & BRONZE FOR ARCHITECTURAL PURPOSES.

EVERY observant person has noticed how the use of ornamental iron and bronze work has been steadily on the increase for use in the large office buildings, apartment houses, hotels and similar buildings recently built in our principal cities. This style of work appears more particularly in the stair and elevator work, railings, fire-escapes, balcony and cornice work, grille work, &c., &c., and produces pleasing and enduring effects. In fact, one of the inducements held out to new tenants seems to be the increased attractiveness of the surroundings gained by ornamentation in nearly every branch of the building trades. Thus a demand has been created which has been felt generally among those engaged in the production of decorative work, and a universal increase in the size of manufacturing plants has been the consequence.

Among the large firms in the Architectural iron trade who have been in the lead for a number of years are Messrs. Poulson & Eger otherwise known as the Hecla Iron & Bronze Works, who have offices and exhibit rooms in the World building, New York, and whose extensive plant covers the greater part of an entire block in Brooklyn and a large part of another.

This firm has done the architectural iron work in a great part of the large



buildings and structures which have been erected in New York and vicinity during the last fifteen years, viz: Produce exchange, Standard Oil, Equitable Life Association, Cotton Exchange, Temple Court, Times Building, World

Building, New Herald Building, Brooklyn Bridge, new viaduct, &c., &c.

The limited space precludes any extensive description of the class of work produced by this firm. The cut of gate above will give some idea of the richness of their work.

This gate is one of four made by them for the Temple Beth-El, Seventy-sixth street and Fifth avenue, New York city. Each of same is 7 feet 4 inches wide by 5 feet 10 inches in height, the total space covered by them being 29 feet across the main entrance, they being hinged in twos.

They each weigh about 750 lbs., making a total of nearly a ton and a half of bronze metal. They are cast in long sections, fitted and joined together.

The Burr & Houston Co., 33 to 39 Franklin street, Brooklyn, N. Y., have done a rushing business during the past season and have still plenty of orders on hand. They make a specialty of fine castings for light machinery, etc.

A PROSPEROUS YEAR.

THE Garden City Sand Co., Chicago, Ill., seem to be doing a mammoth business in molding sand, fire brick, etc. During 1892 they claim to have furnished Chicago foundries with 200 cars of sand alone, a month, their total sales during 1892 amounting to nearly $400,000, the exact number of car loads being 12,246, or over 1,000 a month. They have the exclusive agency in that market for several brands of fire-brick and grades of molding sand, and have furnished all the fire-brick for all the boilers in the World's Fair grounds with one exception, and have contracted to furnish the sand for the large glass manufacturing establishment being erected by the Libbey Glass Co.

Evidently it pays to handle high grade goods and if their business in foundry facings, etc., keeps pace with the rest of it, they are to be congratulated.

We are very much pleased with the paper so far. I wait very anxiously for it every month, and by and by I hope to see it semi-monthly, a month is too long to wait.

W. S. SUTHERLAND, Foreman
Cornell's Foundry, 26th street & 11th avenue, New York, N. Y.

Questions AND Answers.

It is our object to use this column to the best advantage possible, and instead of securing replies to all queries and publishing both together, we prefer to publish answers in the succeeding numbers, in order that as far as possible, every opportunity may be given our readers to contribute.

On the subject of a brass facing, we have as follows:

In answer to a query as to what will peel brass castings, I would say, I have seen some of the brightest and cleanest castings turned out by mixing in a hundred weight of metal one and one-half ounces of pure aluminum. It causes the metal to run a trifle freer, scales the work *perfectly* and permits the casting being finished with ease. The castings when cold have the color of fine gold.

C. D. PEET.

In regard to brass castings peeling would say, I have tried almost everything and find soapstone mixed with a little light clay water, beer, molasses and skin dried, to work well. If not dried in this manner, I use nothing but black lead, which I rub in with my hand. You can also use black lead with a camel's hair brush. I have cast pieces weighing twenty-six hundred weight in green sand using the material which I have stated above, and they have proved a success, and a wire brush was not required in removing the sand. I, as a rule run large castings at the bottom if I can possibly do so. By so doing, the metal flows into the mold without any danger of cutting. I am making, at present, a lot of bearings for the main shaft of a new boat for the Fall River Line of Steamers. They are twenty-six inches in the bore and the weight of the top is two thousand pounds, that of the bottom, eighteen hundred pounds and that of the check pieces, six hundred and fifty pounds each. With these bearings I am using black lead, which I spoke of previously. Yours respectfully,

DAVID WILSON.

Concerning questions appearing in previous issue on cupola practice would reply, taking the questions in their order as follows:

Q.—What effect, or does it effect iron (cast) as to hardness to melt the same brands and same mixture either in a 30″ dia or 60″ cupola?

A.—None, necessarily.

Q.—If Tuyeres are 10″ above the sand bottom in a cupola, will the iron castings be harder and more difficult to finish than the same mixture melted in a cupola with tuyeres 26″ or 30″ above the sand bottom?

A.—No.

Q.—Does a cupola melt iron faster with a fan or blower 30 feet or more removed from the cupola than if it is within 6 or 10 feet?

A.—If the requisite volume of blast is being delivered to maintain perfect combustion, No.

Q.—Would the increase of dia. of wind pipe to three times the area of the opening in the fan or blower bring better results than one continuous dia. same as opening at exit from blower?

A.—Not if the small pipe was equal to the task of delivering or conveying the amount of air required without undue loss by friction.

B. H. asks: In a cupola 32 inches inside diameter, what should be the area of tuyeres to insure best results, also give size of blast pipe, amount of air pressure, ounces and number of cubic inches of air that should be supplied to insure best results.

G. S. A. says that he learns on good authority that there are one or two foundries in this country who make a success of casting cast iron bells and would like some reader of THE FOUNDRY to give him some idea of the mixture used.

D. J. K. writes us that he has been having more or less trouble with some copper castings he has been making for electrical purposes. It is necessary that they be made of pure copper and entirely free from "pin holes" but in spite of the best care possible, such as molding in dry sand, heavy riser, etc., they have continued to appear full of pin holes and he desires some one to suggest a remedy.

J. S. Clark, Colorado Iron Works, Thomas Cox & Son, Davis-Creswell Manufacturing Company, F. M. Davis Iron Works Company, Hendey & Meyer Engineering Company, Messrs McFarlane, T. C. Walker, Queen City Foundry, Union Iron Works and Western Foundry. About 200 men are employed, with an annual pay-roll of $187,000, the value of the annual product being $500,000.

The Davis-Creswell Manufacturing Company has thirty employed in the brass department, while W. T. Davoren of the Denver Brass Works and A. F. Evers & Co. may possibly have ten men, the three establishments having an aggregate pay-roll of $24,000, the total value of the goods manufactured during 1892 being $96,000. An increase of business is reported for 1892 and the above firms are well able to meet all local demands.

PERSONAL MENTION.

Mr. Joshua L. Galloway has sold his interest in the Billingham Bay Iron Works, New Whatcom, Wash., to Albert Reuter formerly of Milwaukee, Wis. The Billingham Bay Iron Works operate a general jobbing foundry and machine shop.

W. R. Luke, well known in San Francisco, Cal., Hancock, Mich., and other places, is now foreman of the foundry of the Great Falls Iron Works, Great Falls, Mont. He writes us that business is booming, having tripled since last spring. They do a general line of work, principally mining, and turn out about 75 tons of castings a month, employing 6 molders.

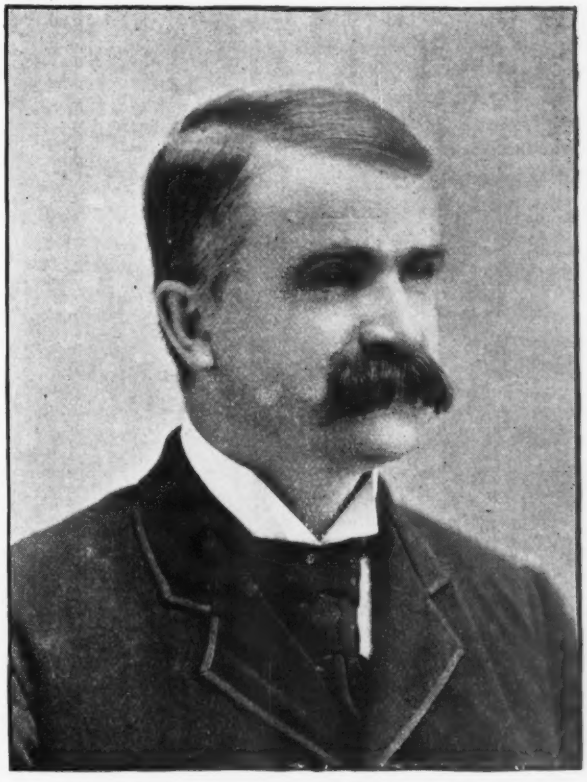
Wm. M. Cowan, who for a number of years has been with the Dickson M'f'g Co., at Scranton, Pa., has resigned his position as their foundry foreman and accepted the manage ment of the foundry department of the Jonson Engineering and Foundry Co., New York City. Mr. Cowan is a most thorough foundry manager and the Johnson Company may feel justly proud of securing his services.

Mr. John E. Daly, for some time foreman of the Simpson Foundry Co., Brooklyn, N. Y., has been appointed to the position of superintendent. They do a large line of architectural and jobbing work and have completed the iron work for a large six-story and basement building at 68 Park Place, New York, on the site of the building that collapsed about 18 months ago with so much loss of life. The columns for the first story are 24 inches square, the corner ones weighing 2 tons each.

The death of Victor Colliau at his residence in this city, Jan. 17th, last, has removed a figure well known in American foundry circles. He was born in Paris, France, 1828, his parents and family for generations being prominent iron masters. Coming to this country he settled in 1857 in West Virginia, but subsequently losing everything in the war he went to New York, afterwards settling in Detroit. In 1884 he patented what afterwards became known as the Colliau Cupola. He was said to be noted as an artist as well, both his oil and water color work having received special mention. We understand his business will still be carried on in his name.

DAVID SPENCE.

MR. DAVID SPENCE is the name of a gentleman well known in the foundry world, both from his knowledge of the business, experience in various sections of the country and because of some contributions to mechanical papers on foundry subjects. Mr. Spence was born in Moncton, N. B., in 1844, and learned his trade as a molder in the foundry of C. B. Record & Co., in that city, where he had an opportunity to see some good work done in the making of mill, ship, railroad and locomotive castings. After an apprenticeship of five years he came to Boston working in The Old Fulton at South Boston, American Tool Company and Bislee & Endicott, Chelsea, Mass. In 1886, Mr. Spence accepted the foremanship of A. Robbs' foundry at Amherst, Nova Scotia, remaining for four years, being then made superintendent of the various departments which position he held for 7 years, leaving then to start the foundry of D. Spence & Co., in the same place, which he managed until 1880, returning to Boston and starting the foundry of B. F. Sturtevant at Jamaica Plain, near Boston, going from there to Galesburg, Ill., to take charge of the foundry of G. W. Brown & Co., who operate one of the largest, if not the largest, corn planter works in this or any other country. It was while here that Mr. Spence gave some attention to the securing of better results from the cupola in the way of mixing iron to get the best results in the way of strength, some articles from his pen on that subject being published at that time. Leaving Galesburg, owing to the ill-health of a daughter, Mr. Spence went to Williamsport, Pa., where he has charge of the foundry of the Demorest Manufacturing Co.



DAVID SPENCE.

As a foreman, Mr. Spence has the reputation of being a good manager of men and is somewhat prominent in his locality in prohibitionist circles. That he enjoys a large measure of the confidence and respect of those about him is amply borne out by the fact that recently on his 47th birthday he was presented by the company and employees with a magnificent gold watch.

"Tips to inventors" is the the suggestive title of a well-written and well printed book of 100 pages issued by the Practical Publishing Co., of 21 Park Row, New York; price $3.00. We clip the following from the introduction: "In looking over the broad field of industry the intelligent observer is struck with two things. First, the high degree of pecuniary reward which has been attained by those inventors who have gone to work to supply something that the world needed, and second, the great number of lines in which there is still opportunity for inventors to achieve success." Chapters on the many subjects contained in each branch of the mechanical, electrical, physical worlds, etc., then deal at length with the opportunities which still exist for the inventor's genius.

We are very much pleased with the appearance of your publication. *Manufacturers' Record*, Baltimore, Md.

H. W. Knight & Son.

METALLIC Letters AND Pattern FIGURES FOR FOUNDRYMEN USE ON PATTERNS.

Seven Falls, N.Y. Feb. 25, 1893.

Messrs FOUNDRY PUBLISHING Co.,

Detroit, Mich.

GENTLEMEN: -

Answering yours of the 16th. we beg to say we are very well satisfied with the results from our ad. in The Foundry. One order alone, nearly paid the first bill for advertising, and we are constantly receiving requests for our Catalogue and prices.

Wishing you success, we are,

Very respectfully yours,

H. W. Knight & Son.

Dic. H.D.Knight.

J.H. WHITING, Pres't & TREASURER. G.A. TRUESDELL, SEC'Y & ENGINEER. S.T. JOHNSTON, GEN'L AGENT.

THE WHITING CUPOLA

Detroit Foundry Equipment Co.

MANUFACTURERS OF

Whiting's Improved Car Wheel Foundry Plant.

General Foundry Outfitters.

FOUNDRY LABOR SAVING DEVICES.
THE WHITING CUPOLA, UNIMPROVED GEARED LADLES, ELECTRIC, STEAM, BELT AND HAND POWER CRANES & DERRICKS, RESERVOIRS, ELEVATORS, JUMBLERS, TRUCKS, FLASKS, SAND SIFTERS, CHILLS & CASTINGS OF ALL KINDS.

DETROIT: MAIN OFFICE & WORKS, HIGH, AVE. & D. A. & C. R'R'
CHICAGO OFFICE: 90 WEST JACKSON STREET.

CABLE ADDRESS: CUPOLA.

Detroit, Mich March 1, 1893.

Foundry Publishing Co.,

City.

Gentlemen:

We enclose check covering price of our advertisement for last quarter. You may continue it in same space until further notice.

We trace a good many of our inquiries for Whiting Cupolas, Cranes and Ladles directly to your Journal, and consider it an effective medium through which to reach the foundry trade.

Kindly return voucher promptly, and oblige,

Yours very respectfully,

Detroit Foundry Equipment Co.

By Geo. Truesdell Sec.

AN IRON FURNACE ON THE PACIFIC.

IRON men in Seattle, Wash., are just now delighted with the prospect of their having an iron furnace in their locality, which, if started, will undoubtedly be the beginning of a new era in Pacific Coast iron matters.

It is said that reliable men stand ready to contract for the delivery of an ore containing 60 per cent. of iron and practically free from sulphur and phosphorous, either magnetic or hematite, while there is an abundance of limestone and coking coal most conveniently situated. It would seem that there was room for something of this sort on the coast and it ought to be very profitable. It is asserted by experts that it can be made for $14 a ton, while the lowest price it has ever been made at in Western Pennsylvania is $11 and in Alabama $7 a ton. As from $10 to $15 has been added to this for freight, it would seem that quite a margin exists, as it is said that 1,500 tons a day are used on the Pacific coast between San Francisco and Seattle and now all that is wanted is for the furnace people to begin operations.

BOOKS, EXCHANGES, CATALOGUES, ETC.

The Cosmopolitan for March has an article from the pen of Mrs. Henrotin, Vice-President of the Women's Branch of the World's Congress Auxiliary at the great fair on the sociological benefits likely to be derived from the meeting together in Chicago next summer of the representative wise men of all nations and people on the globe, and the lessons they will carry home with them to quicken the thought and mode of life in their respective countries. "The Home of the Dragons" is an especially strong story of life in our great cities and after a style not often attempted by magazine writers. There is also something unique in the shape of an especially strong novel by the German writer, Spielhagen, the scene being laid in Berlin. The third article on "The Great Railway Systems of the World" deals with that stupendous undertaking the Trans-Siberian Railway which is to unite the Baltic and the Pacific. The literary character of *The Cosmopolitan* is further maintained by a characteristic study of "Cer vantes, Zola, Kipling & Co.," from the pen of Brander Matthews; a striking story by Julian Gordon; Murat Halstead's delightfully illustrated description of the famous Campo Santo of Genoa, and a most delicate bit of verse, "Slander," by Edgar Fawcett, suggesting a moral no sermon could have better conveyed. Other articles, on "The British Navy." "The Ruins of St. Cloud," so rich in historical associations, and "The Abysmal Depths of the Sea," render this number unusually attractive.

The Adjustable Snap Flask Co., of Liberty, Ind.. have issued a neat catalogue descriptive of the various styles of snap flasks manufactured by them.

THE FOUNDRY begs to acknowledge the receipt of a handsome catalogue issued by the Kilbourne & Jacobs M'f'g. Co., of Columbus, Ohio, and containing full description and much specific information concerning the very full line of iron wheel barrows, charging barrows and pig-iron barrows, etc., made by this firm. As they claim to be the largest manufacturers of this line of goods in the country and appear to make a very complete line, intending purchasers might find it to their advantage to investigate.

Cassier's Magazine is welcomed this month among others to our exchange table. To those of our readers not yet acquainted with this magnificent trade journal, we would just say that is of magazine size, resembling outwardly *Harper's*, *Century*, or the *Cosmopolitan* magazines in appearance, and inwardly, printed and edited in the same highly artistic style. Well written, handsomely illustrated articles on mechanical subjects make it easily a leader among leaders and a type of what the trade journal should be.

The International Machinists Union of America have come to the front with an official organ called the "*Machine & Forge.*" It is edited by N. Morse, 703 Broadway, New York; subscription $1 per year, is octavo in size. The initial number contains 16 pages, is well printed on good paper, has a bright, clean appearance and is certainly a credit to all concerned. Bro. Morse himself is deserving of especial praise; let him establish his standard on a high plane and aim to make the "*Machine & Forge*" as good as the best, if he does this, we believe, with his energy and devotion, he will "get there."

The West Coast Iron Works Company of Seattle, Wash., has completed the construction of its foundy building on the corner of Railroad avenue and D street. It is a large building, 150 feet by 100 feet. The company is now putting in the machinery and in a few days will be

prepared to do all kinds of foundry and machine work.

One of the most interesting and timely publications added to our exchange list of late is called THE FOUNDRY, a new magazine issued by THE FOUNDRY Publishing Company, of Detroit, Mich. The new comer, as its name indicates, is devoted to the entire foundry business, which we take pleasure in adding, it most ably represents. THE FOUNDRY appears in magazine form and judging from the growing bulkiness of each succeeding issue, it is apparent that the magazine is being kindly received by the trade interests it so ably and well represents. We gladly add it to our exchange list and wish it still further success.—*Mechanical News, New York.*

The December number of THE FOUNDRY, a new journal devoted exclusively to foundry matters, has reached our table, and in our opinion, will undoubtedly commend itself to every practical foundryman. It is published in magazine form, with cover, and has 32 pages of reading matter, in which we find practical articles by well-known writers on foundry matters. The editor of the new journal, Mr. John Penton, is a foundryman, and we welcome this new and creditable addition to the field of technical journalism. It is published monthly by The Foundry Publishing Co., Detroit, Mich. —*American Machinist* (*Jan. 5*)

The Foundrymen of Chattanooga, Tenn., have resolved to form a Foundrymen's Association and have held a preliminary meeting, at which Newell Sanders was chosen chairman.

The Jos. Dixon Co., Jersey City, N. J., never do anything by halves and in their advertising are unique always, in originality. Their latest is a magnificent specimen of the printers' art in the shape of a richly illustrated catalogue descriptive of their lead pencils, specialties, etc.

The Chicago Foundry Supply Co., Chicago, Ill., have issued a neat folder, advertising a patent flux that ought to be of great interest to all brass foundries, as it is claimed that it has wonderful properties when any old brass or copper is being remelted as it entirely obviates the usual difficulties encountered in melting those metals in the way of securing castings free from flaws.

The *Manufacturers' Record* Publishing Co., Baltimore, Md., has started the publication of the *Manufacturers' Record Magazine*, devoted entirely to the industrial interests of the South and aiming to present in compact, attractive form such information about the South as is of interest to the general reader. It is finely illustrated and the first number is a most creditable one and we believe that in the hands of those who have pushed the *Manufacturers' Record* to the front, it will be a success.

The item in the February issue of THE FOUNDRY, to the effect that the foundry of the Grand Rapids School Furniture Co. was running half time was an error, as the company write us that they are quite busy and have commenced the erection of a brick three-story addition to their factory 245x52, making their main building 405 feet long with a wing 250x50.

We mentioned in the February issue that it was rumored R. D. Wood & Co., Philadelphia, were about to construct a foundry on Long Island, N. Y. Since then we have learned that there was no foundation for the rumor.

I feel great pleasure in saying I like the appearance of the THE FOUNDRY and think it will fill a long-felt want for the foundrymen of this great country. ALEX. H. STEEL,
Brookville, Pa.

THE FIRE FIEND.

Perez de La Riva's foundry in Mantanzas, Havana, was destroyed by fire Feb. 3rd. Loss, $100,000.

The Foundry Facing Company's plant owned by F. A. Coleman Co., at Brushton, Pa., was destroyed by fire.

Sterret & Thomas' Iron Foundry Pittsburgh, Pa., was destroyed by fire Feb. 11th. Loss $20,000; insurance $13,000.

Crawford's Engine Works at Duluth, Minn., was destroyed by fire Feb. 1st. It was first discovered at 10:30 p. m., but promptly extinguished, took fire again at 2 a. m., and was then consumed. Cause said to be incendiary.

The Detroit Electrical Works, Detroit, Mich., have recently added to their shop two 10-ton traveling cranes and one 15-ton jib crane. These cranes were recently successfully tested with loads 50 per cent. in excess of their rated capacity. They were manufactured and erected, together with the traveling crane tracks and supports, by the Detroit Foundry Equipment Co., Detroit, Mich.

THE FOUNDRYMENS ASSOCIATION

THE twenty-second meeting of the Foundrymen's Association held at the Manufacturer's Club, Philadelphia, Wednesday evening March 1st, at 8 o'clock. President Mr. Francis Schumann in the chair. The minutes of the last meeting were read and adopted.

The following were present:

J. W. Gephart, Valentine Iron Co., Bellefont, Pa.
J. Henry Pepper, *The Iron Age*, Philadelphia.
James Marshall, Hostetter Connellsville Coke Co., Pittsburgh, Pa.
Fred B. Lott, Secretary Davis Coke & Coal Co., Baltimore, Md.
C. L. Prince, Camden Iron Works.
George P. Smyser, E. G. Smyser's Sons, York, Pa.
Walter Wood, R. D. Wood & Co., Philadelphia.
J. M. Wanner, Mellert Foundry & Machine Co., Philadelphia.
L. B. Whitney and Chas. H. Whitney of A. Whitney & Sons, Philadelphia.
Arthur W. Howe, "
J. L. Delaplain, United States Foundry Co., New York.
Theo. B. Rohrman, Philadelphia.
Thomas Glover, Glover Bros., Philadelphia.
W. H. Hunt, Wm. Adams & Co., "
S. G. Flagg, Jr., Stanley G. Flagg & Co., "
G. R. Rebmann, G. Rebmann & Co., "
W. C. Henderson, Thomas Devlin & Co., "
James S. Stirling, Harlan & Hollingsworth Co., Wilmington, Del.
Isaac R. Newkirk, Wm. Wharton, Jr., & Co., Philadelphia.
H. M. Kolb, Lansdale Iron Works, Lansdale, Pa.
Geo. T. Johnson, Thomas Iron Co., Hokendaqua, Pa.
Andrew McCardell, Pond Machine Tool Co., Plainfield, N. J.
Justice Cox, Jr., Mahoning Rolling Mill Co., Danville, Pa.
Josiah Thompson, J. Thompson & Co., Phila.
George R. Walker, " " "
Chas. R. Schmidt, Henry McShane M'f'g. Co., Baltimore, Md.
G. T. Marsh, Supt. S. Baltimore Foundry, Baltimore, Md.
Thomas Hobson, *Iron Age*, Philadelphia.
George Mitchell, Mitchell & Sheppard, Phila.
W. S Hallowell, Harrison Safety Boiler Works, Phila.
Wm. Adams, Wm. Adams & Co., Philadelphia.
Thos. Devlin, Thos. Devlin & Co., "
Hy. Ruhland, Hy. Ruhland & Co., "
W. H. Pfaehler, Abram Cox Stove Co., "
Francis Schumann, Tacony Iron & Metal Co., Tacony, Phila.
Guyon Miller, Secretary Downington M'f'g. Co., Downington, Pa.
Abram S. Patterson, Mahoning Rolling Mill Co., Danville, Pa.
A. B. Paxson and Howard Evans, J. W. Paxson & Co., Philadelphia.
Frank R. Jones, Jerome Keeley & Co., Phila.

The executive committee reported that the subject of coke for foundry use is an important one and it is their wish to continue the discussion and invite representatives from different coke sections of the country to instruct the foundrymen regarding its adaptability for fuel in the cupola in comparison with coal and the analysis of same. The address by Mr. Jones Wister, regarding coke, at the February meeting has been appreciated and a number of inquiries from different part of the country have been received, asking for further information regarding the quality and adaptability of coke, brought about by his address.

The Secretary has been instructed to send out bills for dues to November, 1893, which is the end of our business year. This is done to save book keeping and make a starting point for all members.

The Treasurer reported a balance of $99.76, and all bills paid. The following new members were elected:

Abendroth Bros., Port Chester, N. Y., Manfacturers of soil pipe, stove plate and small castings.
The Vulcan Iron Works Co., Seattle, Wash., iron, brass and architectural work.
Thomas Iron Co., Hokendaqua, Pa., George T. Johnson, Agent., 319 Willings Alley, Philadelphia, manufacturers pig-iron & foundry.
Jerome Keeley & Co., 303 Walnut street, Philadelphia, pig iron and coke.
Wilhelm & Co., Harrisburg, Pa., pig-iron and coke.
S. Baltimore Foundry, Baltimore, Md., G. T. Marsh, Supt. Manufacturers of cars and general castings.
Hostetter Connellsville Coke Co., James Marshall, Agent, Pittsburgh, Pa.

The freight and railroad committee reported

progress. A discussion then took place regarding the forming of sections in this association according to the kind of castings made. There are now represented in this association seven or eight branches of foundry trade. There has been a committee appointed representing each branch whose object is to report current prices for castings that the members may know the actual market price. It is the further object of this committee to get the respective foundries making the same class of castings together and talk over the possibilities of improving their conditions hoping to make a combination looking toward procuring better prices for their work. The tendency of the times leans toward the combination of interests all over the United States which seems to be the only reasonable plan to make business a success. The cutting of prices and the ill-feeling now existing which tend to the breaking up of organizations must stop and the sooner it is done the better for all concerned. This was the drift of the discussion. Mr. P. D. Wanner lead most emphatically, stating that the time would come when combinations would be the rule and all trades would come together throwing aside prejudices and have an understanding that will result to their mutual interest. To confirm these facts he stated that contracts for cast iron pipes were taken at one cent per pound at the works, which is the lowest ever recorded, and that it was impossible for any concern to make money at these prices.

Mr. George P. Smyser advocated the forming of sections according to the kind of castings made. He had already had some experience which was successful and as a representative of the structural iron interest he would call them together and have an understanding at once, as he was satisfied it could be done without difficulty.

Mr. Flagg stated that the reporting of the average prices of castings was of no avail as it did not cover the ground with any degree of certainty and the only way to make a definite price at which castings are sold would be to report actual contracts taken.

Mr. Schumann stated that each member of the committee representing the different branches should constitute the chairman of the section which he represented, and should make it his business to notify those whose interests were identical and explain to them the necessity of joining this association and help each other to make business a success.

It was moved and seconded that the President have power to appoint additions to the price committee to accomodate the different trades, as the present committee of five did not include the manufacture of soil pipe, loam castings and sash weights.

The President thereupon appointed the following persons to represent these trades.

Soil Pipe—Mr. Robt. J. Register of J. Register & Sons, Baltimore, Md.

Loam Castings—J. Sellers Bancroft of Wm. Sellers & Co., Incorporated.

Sash Weights—E. E. Brown, E. E. Brown & Co.

On account of the lateness of the hour the discussion on coke and coal was postponed until April meeting.

The meeting then adjourned to partake of the lunch, served at the expense of the association, in the roof garden of the club.

This has been a very interesting meeting and the sentiment of the combination of interests was appreciated and received with favor as the only way for future success. After the lunch addresses were made by Messrs. W. H. Pfaehler of the Abram Cox Stove Co., Abram S. Patterson of the Mahoning Rolling Mill Co., who represented the Manufacturers' Club before the Senate Committee, before the House of Representatives at Harrisburg to defeat the Employers Liability Bill, which makes the employer liable to his employees for accidents or damages to the fullest extent. They both stated it was quite probable that their efforts were appreciated and that the bill would, no doubt, die in the committee.

A number of other remarks were made tending to the pronounced success of this association.

HOWARD EVANS, Secretary,
Pier 45, N. Delaware Ave., Philadelphia.

Everyone here reads THE FOUNDRY, it is a good thing and just what every foundryman ought to read.

JOHN C. WEHN,
Seattle, Wash.

Austin Bros. & Porter's foundry was destroyed by fire at Tyrone, Pa., Feb. 1st.

We are pleased with your publication and think you would be more pleased with a paid subscription.

WALE & ECCLESTON,
Nebraska City, Neb.

ENTERPRISE.

THE Detroit Foundry Equipment Co., are sending out the following circular, which is self-explanatory, and as a piece of enterprise is especially commendable on their part:

FOUNDRYMEN'S EXCHANGE.

"At the suggestion of many friends we have arranged what might be termed a 'Club Room,' at 225 Dearborn street, room 703; where we trust those interested in the foundry business will find it pleasant, convenient, and, perhaps gain suggestions concerning this important branch of trade that may be useful in operating and reducing cost of manufacturing castings.

Perhaps this may suggest the formation of a permanent foundrymen's association conducted much after the plans of the Philadelphia organization, where much good has resulted. This subject, with others, can be discussed, and we hope our informal plan will meet with favor and that you and your friends will accept an opportunity to make acquaintances, exchanging and combining mutual thoughts beneficial to all.

Papers, journals, and other reading matter, writing materials, etc., with other conveniences will always be found at your disposal. You are most cordially invited to call when in Chicago; our most earnest hope is that you will not pass by, but make free and frequent use of the room, obliging,

Yours respectfully,

DETROIT FOUNDRY EQUIPMENT CO.

Main office, 225 Dearborn street, cor. Quincy, Temple Court; room 702 and 703, Chicago, Ill."

A NEW WORK ON IRON FOUNDING.

MR. BOLLAND has been so much pleased with the cordial welcome extended to his work on the foundry business entitled "The Iron Founder" that he has been for some time preparing the material for a second volume, to be called "The Iron Founder Supplement" and which will be ready for delivery April 1st. As will be seen by a glance at its contents it is going to be a most valuable and comprehensive work, treating on a vast number of subjects in the author's best style.

In another part of THE FOUNDRY is the table of contents and we predict a warm reception and large sale.

MR. WISTER'S ADDRESS.

THE address delivered before the Philadelphia Foundrymen's Association Feb. 1st, last, by Mr. Jones Wister on the subject of "Coke" was the most interesting article on that important subject that we ever remember having seen. It really contained much information, some of it being entirely new, and no one interested in the foundry business as a coke buyer or user should neglect to peruse it carefully.

The J. S. McCormick Co., of Pittsburgh, Pa., are doing an exceedingly fine business with their facings and are making large shipments north, south, east and west. Their facings are giving entire satisfaction. Owing to the large demand their goods are receiving, it has been found necessary for them to put in additional machinery so as to keep pace with their orders and are now in a position to fill both large and small orders promptly. We should recommend our patrons to give them a trial as we feel certain they will find their facings as advertised in another portion of our Journal.

NEW FOUNDRY ENTERPRISES.

The Maine Central will build a foundry and machine shop at Lancaster, N. H.

J. M. Patterson is to erect a new foundry at Kansas City, Mo., to cost $1,500.

T. B. Lamoreaux has got his new foundry started at Faribault, Minn.

Macey & Wiltse have purchased the foundry of Geo. H. Snyder at Ghent, N. Y.

C. B. Bailey is rebuilding his foundry at Elkland, N. Y.

The new stove foundry at Fort Payne, Ala., has commenced running.

Messrs. Dobbie & Stewart who recently erected a foundry at Niagara Falls, N. Y., are already enlarging.

The Ohio Foundry Company, the latest addition to Toledo's industries, took off their first heat Feb. 13.

The Chicago papers of recent date have contained several items relative to the removal of The Detroit Foundry Equipment Co., to that city. The facts apparently being that they have secured 15 acres at Chicago Ridge near Chicago and will commence the erection of two large buildings 90x17 feet, others to be added later on. The manufacture of car wheels on a large scale is, it is said, also contemplated.

James F. Bowe and John Lewis, of Hunter Co.'s Iron Foundry, Springfield, Mass., have formed a partnership to operate the foundry at Winsted, Conn.

The Moore Foundry is to erect a new foundry at South Milwaukee, Wis.

Mr. Edmonds, formerly of Norfolk, Va., will erect a foundry at Dallas, Texas.

The Menominee M'f'g. Co. have been incorporated to start a foundry at Menominee, Wis.

The Mark Flather Foundry Co., will build a new foundry at Nashua, N. H., the coming spring.

AMONG THE FOUNDRIES.

Michael Hynes has bought the Paddock Iron Foundry at St. Johnsburg, Vt.

The Beckel Foundry, Sand Island, Pa., is offered for sale cheap, with water power.

The Gloversville (N. Y.) Foundry & Machine Co., has been dissolved and gone out of business.

A. V. Hooker & Son have purchased the foundry of Brown Bros. & Stewart at St. Johnsburg, Conn.

The Art Stove Co., Detroit, Mich., contemplate the erection of a foundry that will measure, when completed, 258x120 feet, and possess all the modern improvements.

The Builders Iron Foundry, Providence, R. I., has prepared for exhibit at the World's Fair, a 12-inch breech loading rifle mortar weighing 14 tons.

Austin Bros. & Porter, whose foundry and machine shop was burned at Tyrone, Pa., recently, have decided not to rebuild, and it is said that there exists a good opportunity there for the right man.

The Great Western Manufacturing Co., of Leavenworth, Kas., contemplate enlarging their foundry by an addition of 100x50 feet, they manufacture all kinds of mill machinery.

An explosion at the Star Foundry, Worcester, Mass., Feb. 4th, injured 15 men. It was caused by dropping the cupola with considerable melted iron in it, which, falling on the damp floor where there might have been some water, generated a gas which exploded with force, blowing out the windows and seriously injuring the building.

At Rusk, Texas, the State Penitentiary has within its inclosure operated by convict labor, an iron furnace for making pig-iron and a pipe foundry with facilities for making pipe from 4 inches to 2 feet diameter.

It is said that H. A. Streeter of Chicago will erect an iron foundry in Mt. Vernon, Ill.

The Record Foundry & Machine Co., St. John, N. B., have increased their capital from $35,000 to $60,000.

At Raritan, N. J., Feb. 24, the foundry building of the American Farm Implement Company was burned. Loss, $30,000; no insurance.

Owing to the spilling of a ladle of metal in the foundry of James Gregory in New York, Feb. 26th, six men were burned, two of them very badly.

Mr. William Nash has started a sash weight foundry on Eleventh street, between Drigg's avenue and Roebling street, Brooklyn, N. Y., and J. L. Madden has commenced another on No. 12th street, between Driggs and Union avenues.

The Cleveland Steel Casting Company, of Cleveland, O., was recently organized with a capital stock of $100,000. The company have purchased ten acres of land in the city of Cleveland, and have let the contract for an iron building 96 feet by 265 feet. It will erect a 10-ton Siemens Martin open hearth furnace. The works will be equipped with a 20-ton electric traveling crane. Building operations will be commenced as soon as the frost is out of the ground.

A new one-story foundry building, 80 feet front and 100 feet deep, is being added to the works of the Globe Iron & Foundry Company, on Ninth and Victor streets, St. Louis, Mo. Twenty men will be employed at the start in the new department, and others will be added as the increase of business requires. The company are quite busy on house work—railings, store fronts, etc. Among other contracts now being filled is one for the ornamental iron work for the pavilion now being erected at Forest Park by the Missouri Railway Company.

The Berlin Iron Bridge Co., of East Berlin, Conn., will build the new machine shop for S. F. Hodge & Co., Detroit, Mich. The building will be 150 feet long and of the modern type, the central portion being 40 feet in width controlled by a traveling crane of 20 tons capacity, with a wing on each side 22 feet in width, the wings being two stories high. When completed it will be one of the best machine shops in the North-west.

The Vulcan Foundry of New Castle, Pa.,

makes the ingot molds for the Shenango Steel Mill, New Castle. A few days ago the establishment completed over 700 molds without the loss of a casting. These molds weigh from 5,400 to 5,500 pounds each.

PIG IRON.

An Account of the Blast Furnace Process by which the Ores are Reduced to Pig Iron.

THE modern blast furnace is supposed to have originated in the Rhine provinces about the beginning of the fourteenth century, but whether in France, Germany or Belgium is not clear. One hundred years later, in 1409, there was a blast furnace in the valley of Massavaux, in France, and it is claimed by Landrin that there were many blast furnaces in France about 1450. The exact date of the erection of the first blast furnace in England is unknown, but it was along in the fifteenth century. The first attempt to make pig iron in the United States was in 1645, at Lynn, Massachusetts. We see, therefore, that, although iron melted by charcoal in the old Catalan forges was used many hundreds of years ago, cast iron or pig iron is of comparative recent origin, and may be said is yet in its infancy.

In the reduction of the ores the fuel may be charcoal, coke, block coal or anthracite coal. Charcoal is freer from impurities than any of the fuels and has been used from the earliest times. Experiments were begun in 1630 with coal and coke, but it was not until 1735 that any degree of success was attained. The first successful blast with coke as fuel was made by Abraham Darby, of Shropshire, at his furnace at Coalbrookdale, England, in the year 1735. The first successful manufacture of pig iron with anthracite coal was by George Crane, an Englishman, at Yniscedirin, in Wales, in 1837. The blast used in furnaces was cold, until 1825, when James Beaumont, of Scotland, invented the hot blast now in general use all over the world. In order to separate the extraneous matter usually contained in a furnace charge of ore and reducing agent, certain materials must be added to form *slags*. These materials are known as *fluxes*. Limestone constitutes the bulk of fluxing used by the blast furnace. The slags of a blast furnace are its refuse, and are formed by a combination of silica with the earths and metallic oxides. They are used, if not too glassy, for macadamizing roads; it makes an excellent railroad ballast, as the mass is very permeable and keeps the sleepers dry. It is also used in making brick and cement.

It is not within the province of this book to give an elaborate or detailed description of the blast furnace, but we will briefly describe, without technicalities, how iron is separated from its ores.

Strictly pure iron ore is metallic iron and oxygen in chemical union in fixed and known proportions; the most common being that of peroxide, which is 70 per cent. of iron to 30 per cent. of oxygen by weight.

Iron ores, as mined, consists of various combinations of iron, oxygen, phosphorus, sulphur, carbonate of lime, carbonate of magnesia, silica, alumina, and sometimes water, manganese, titanic acid, etc.

It is the office of the blast furnace to separate the iron from the other materials. Since chemically pure iron is not used in the arts, such is not sought, nor could it be produced in the blast furnace. Commercial pig iron usually contains 92 to 94 per cent. of pure iron and 6 to 8 per cent. of impurities.

The presence or absence of these impurities in varying proportions give to pig iron its varying characteristics, suiting it to widely varying uses. Upon the proper composition of the impurities depends the grade and value of the pigs.

The highest skill of the iron master is exerted to secure the best possible composition, varying the composition to suit the various uses of his patrons.

The chief components of the impurities are carbon, silicon, phosphorus, sulphur and manganese.

The reduction of the oxide of iron by withdrawing the oxygen, the simultaneous carburisation of the resultant metal and the fluxing of the various earths entering the furnace with the oxide of iron and carbon, are accomplished by

the use of the laws of chemical affinities. This use may be empirical or intelligent. The former was the method of the past, sometimes even now disastrously lingering in the lap of the present. The latter is alone in accordance with the spirit of to-day, and is soon to be the sole method of the future. These affinities are absolute and positive, and the skillful furnace manager handles them in full confidence, dividing, adding and subtracting as an accountant does his figures.

All solid materials enter the furnace at the top in carefully considered mixtures, determined by analyses to conform to fixed chemical laws. The air equaling or exceeding the combined weight of the solid materials alone, enters near the bottom. The furnace being full and in action, is found to divide into the following zones: Beginning at the bottom we have first the hearth, which is for receiving and holding the liquid mass until convenient intervals for tapping or drawing out. Very little chemical action occurs here. The molten mass quietly rests and the iron separates from the slag by specific gravity. Next comes the zone of gassification. Into this zone is introduced the blast, previously heated to a temperature of 900 to 1,500° Fah., and is driven in under a pressure of five to ten pounds per square inch, and at the rate of three and one-quarter to six tons for each ton of iron made.

The oxygen of the blast coming into direct contact with the incandescent carbon of the fuel, gassification of the carbon rapidly follows, so rapidly indeed that each atom of carbon takes from the air the smallest amount of oxygen necessary for gassification. That is, one atom of oxygen for each atom of carbon. This action is not confined to the oxygen of the air; it extends to any other oxygen available.

Next above the zone of gassification is the zone of fusion, in which chiefly occurs the reduction of the solids, excepting ash of the fuel, to liquids. Above the zone of fusion is the zone of reduction and carbon impregnation. This should occupy a very large part of the body of the furnace.

Thus, the furnace is divided in three zones, which, however, have no definite limits, but insensibly merge one into the other. Nor is it to be understood that the offices attributed to these zones severally is confined within them.

Perhaps nine-tenths of the carbon is volatilized in the zone of gassification and the balance in the zone of reduction, to which is added the oxygen from the ore and the carbonic acid from the limestone, chiefly in the zone of reduction, the furnace producing gas throughout its entire height.

Nor is fusion confined to the so-called zone of fusion, but may and does frequently extend well into the zone of gassification, and it is known that reduction is not completed and the last of the oxygen does not leave the ore until it is well into the zone of fusion.

The gasses leave the zone of combustion, that is gassification at a temperature of 3,500 to 4,000° Fah. As they ascend the heat is transferred to the descending materials to such an extent that the gasses pass out of the top of the furnace with only 300 to 500° Fah. As the escaping gas weighs much more than the materials charged, and as their specific heat does not materially differ, the gas itself could impart sufficient sensible heat to raise the stock to the hearth temperature were the absorptions and generations of heat due to intervening chemical reactions equal.

As it is, however, it will be seen how perfectly a furnace acts as a regenerator, and how small a heat-waste there may be in a furnace well-conducted. Beginning at the zone of gassification and ascending through the furnace we find the descending materials always just a little lower in temperature than the ascending column of gas at each successive stage; presenting by far the most favorable conditions for heat transfer, where the successive lowering of the gas temperature is met by still cooler materials to further reduce the waste, and even in the most rapid furnace-driving this valuable conservation of heat is not over-hastened for the best and ultimate economy, for at least several hours must elapse while each particle of the stock is descending to the hearth.

Following the ores as they enter the furnace, they are first dried and heated by meeting the hot gasses. As soon as they have reached a sufficient temperature the ore begins to part with its oxygen to the carbonic oxide forming carbonic acid. Carbonic acid is also eliminated from the limestone, and sometimes from the ores, and many associations and desociations occur not necessary to trace in this article.

As the descending ore becomes hotter the action becomes more rapid until the most favorable temperature for reduction by the gasses is reached and passed, when it proceeds more slowly and is supposed to be finally completed by contact with intensely hot solid carbon. That which was ore no longer exists as ore. Its two constituents, which, in chemical union, made it oxide, of iron, have been separated, the oxygen expelled from the top of the furnace while the iron in minute particles, having taken up about 4 per cent. of its own weight of carbon, is found changed from oxide of iron to carbide of iron, and is intermingled with the earths and other material. It remains to separate the iron from the earths and put it into form for convenient handling. To do this the entire mass is fused and falls into the earth. To secure a fusion of its earths a process termed fluxing is resorted to, based on the premise that no single hearth, if pure, will melt in the temperatures ordinarily found in the blast furnace, which, while not strictly true, is sufficiently so for present purposes.

The earths usually entering the furnace are either acid or basic, these two having a strong affinity for each other, and when brought together in proper proportions and into the presence of the high heat found in the fusing iron, readily liquify and fall with the liquid iron into the hearth, where by the difference in their specific gravity, they separate, the slag floating on top of the iron.

The space alloted to this article will not admit of an extended review of methods in use for the control in kind and quantity of the various impurities entering into the pigs.

It is sufficient to say that nearly all of the phosphorus entering the furnace is found in the iron leaving it, and it is contrary to the theory of the blast furnace that any of it can be eliminatd. Its effect is to make the iron cold-short.

By judicious fluxing and management a limited amount of sulphur charged into the furnace may be discharged with the slag, the iron absorbing but traces of this objectionable alloy. The effect of this sulphur upon the iron is to make it red-short, and every effort of the manager should be directed toward its elmination.

The percentage of silicon is controlled by the temperature in the zone of combustion and the character of the flux.

The intensity of the heat required to decompose oxide of silicon is such that it is impossible to conceive that silicon can be obtained anywhere in the blast furnace except in the foci of intense heat near each blow pipe (Bell), therefore, the oxide of silicon must be brought into these foci. The ash of the fuel is brought in and being in part silica, it answers the requirement. When the fuel is high in silica the production of silicon is facilitated.

Likewise, by reason of inadequate fluxing or other cause, portions of the silica of the ore and limestone may find their way into these limited areas of intense heat and contribute silicon.

Carbon, as has been stated, combines with iron as the oxygen leaves it to the extent of about 4 per cent. of its weight.

This has made blast furnacing possible, as the combination is fused at a much lower temperature than malleable iron and within that generated in the process, so that a liquid manageable metal is produced which may be drawn from the hearth and molded into merchantable form.

Carbon exists in pig iron as graphitic and combined, and the relative proportions of each will largely control the grade. To produce iron high in graphite the furnace must be in a healthy condition, so that the materials shall descend evenly and regularly, and the reducing gas as it ascends shall come in contact with and reduce all of the ore before fusion. A comparatively light burden favors the production of an

increased percentage of the reducing gas, and so favors perfect reduction and also carbon deposition.

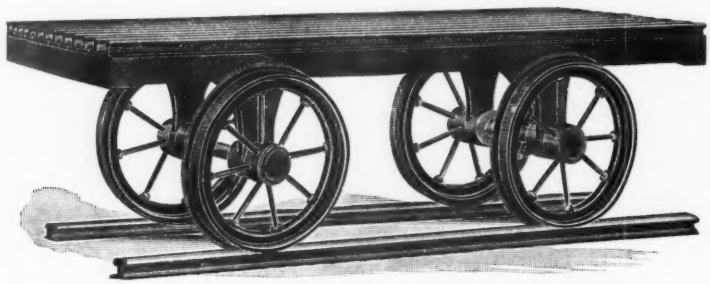
AN EASILY MOVED CORE-OVEN CARRIAGE.

PROBABLY there is not a molder, foreman or proprietor of a foundry in America, or anywhere else, where machinery jobbing or house work is done to any extent requiring the use of a core-oven, carriage, etc., who has not time and again experienced trouble and annoyance from the difficulty of shoving into the core-oven and withdrawing therefrom the core carriage. It can be built as perfectly as possible, the track level and smooth, yet when heavily laden it will be found necessary to press into service a large number of helpers, molders, etc., to shove it to its place, no matter how well oiled, and a still larger number will be needed to pull it out after it has been heated for several hours until every bearing has become stiff and bare. To avoid this, several modern foundries have provided their carriages with a series of gears working on one of the axles and operated by a crank, which, while lessening the trouble somewhat, has only done so partially.

The Kilbourn & Jacobs M'f'g. Co., Columbus, Ohio, have brought a core-oven carriage for which it is claimed, no matter how heavily laden it may be, one man can move it easily, owing to the employment of roller bearings, the axles being on a plan somewhat similar to that in use in the modern bicycle with the difference that in this case additional benefit is derived from the use of a roller bearing instead of a ball bearing and never requires any oil.

The carriage illustrated is made entirely of steel and iron, strongly yet simply put together, the wheels are 23″ in diameter and having improved staggered wrought iron spoke, 3″ tread on rails, hub $4\frac{3}{4}'' \times 5''$, the roller bearings being inside the heavy cast iron hanger in which the axle revolves. These cars are made in all widths, lengths, or any height desired and as the company who make them is among the largest manufacturers in the United States, they have every facility for turning out promptly any orders given them.

"A bushel of corn makes four gallons of whiskey, which sells for $16 at retail. Out of this the government gets $3, the railroads $1, the manufacturer $4, the vender $7, the farmer 40 cents, and the drinker gets the delirium tremens."



CONTENTS OF "THE IRON FOUNDER SUPPLEMENT."

BY SIMPSON BOLLAND.

INTRODUCTION.

1. Antiquity of casting.
2. Blast blowers. A description of the several kinds of blowing engines used in the past, as well as some of those in use at the present day (illustrated).
3. Mixing cast iron.
4. Foundry cupolas. The art of melting iron in them, with table of full instructions for their erection and management.
5. Reverberatory or air furnaces. Their use for the purpose of melting cast iron fully explained.
6. Casting. One hundred tons of cast iron; showing the construction and use of the necessary equipment for pouring heavy castings, dams., receiv-

ers, air furnaces; ladles with table of capacity of runners, &c.

7. Castings. How to obtain their measurement and reckon their weights, also the nature and quality of the materials used in producing them; percentage in the foundry, important facts, formulas, tables, etc.

8. Foundry appliances, including block and plate methods of molding, gear molding by machinery and a description of some modern molding machines.

9. Chains, beams, slings, hooks, ropes, etc., for lifting and handling all classes of work in the foundry.

10. Pouring, flowing off and feeding castings.

11. Studs, chaplets and anchors; how to use and how to avoid using them.

12. High class molding. Explained by a description of the different ways of molding a fourway ventilating shaft.

13. Sectional molding for heavy green sand work, including drawbacks, critical green sand cores, etc., or some things beyond the capacity of the modern molding machine.

14. Hydraulic cylinder molding under difficulties, or big castings in little foundries.

15. The founding of statues, in iron and bronze, explaining the *Cire Perdue* processes, with a review of the art as practiced by the ancients and up to the present time.

16. The art of taking casts; explaining the substances used; plaster of Paris, beeswax, dough, bread crumbs, glue, etc. To take casts in metal from any small animal, insect or vegetable; to take a cast in plaster from a person's face; to take casts from medals; to take casts in isinglass, elastic molds, etc.

17. Pattern molding in clay. To mold a spiral post, etc.

18. The "Berlin" fine cast iron work.

19. Malleable iron castings. The processes of their manufacture explained, including annealing, practical and theoretical.

20. Chilled car wheels. Full instructions for patterns, molding flasks, cores, chills, metal mixing, casting, annealing, testing, with an explanation of the theory of chilling castings.

21. Fire clay and fire bricks.

22. Gannister.

23. Graphite or plumbago.

24. Fuel.

25. Annealing.

26. How to repair broken castings. The foundry methods of "burning" all classes of work fully explained and illustrated.

27. Beams of cast iron; some of their properties described; useful information relating thereto.

28. Wrought or malleable iron; a brief description of its manufacture from the pig-iron, refining, puddling, shingling, etc.

29. Steel; how the different kinds are produced; blister steel, shear steel, cast steel, including Siemans, Martin, Bessemer, etc.

30. Enamel for heavy castings.

31. Black varnish for iron work.

32. Varnishes for pipes and iron work.

33. Varnish for patterns.

34. Cement for cast iron.

35. Mineral wool. The phenomena of its production explained.

36. To distinguish wrought and cast iron from steel.

37. Tinning.

38. New tinning process.

39. Kustitien's metal for tinning.

40. Tin plate, crystalized.

41. To tin iron pots and other domestic articles.

42. To tin cast iron studs and chaplets.

43. Case hardening cast iron.

44. To chill cast iron very hard.

45. To soften cast iron.

46. To scale, clean and pickle cast iron.

47. To remove rust from cast iron.

48. To scour cast iron, zinc or brass.

49. To solder gray cast iron.

50. To deposit copper on cast iron.

51. To bronze iron castings.

52. Brassing cast iron.

53. Green bronze on iron castings.

54. Bronze for cast iron, without the use of metal or alloy.

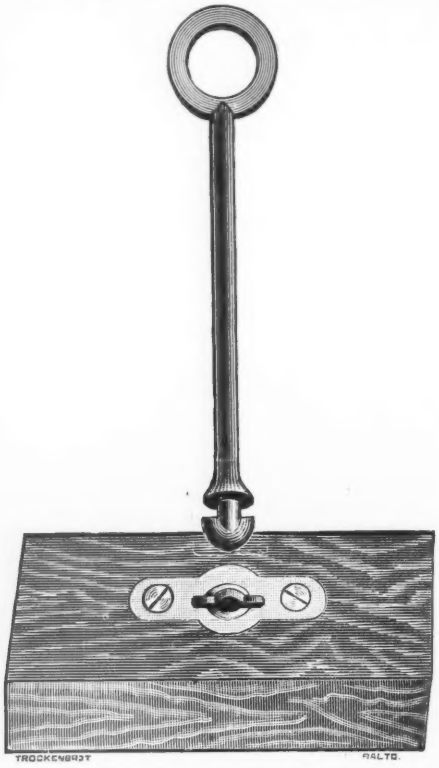
55. To galvanize gray iron castings.

56. To galvanize cast iron through.

57. Japanning castings.
58. To enamel cast iron and hollow ware.
59. Useful interest rules.
60. Interest table.
61. Weights and measures.
62. Areas of circles and sides of squares of equal area.
63. Wages table.

A PATTERN DRAWING DEVICE.

THE damage to wood patterns resulting from want of proper draw keys and rapping plates is too well known to need much comment. Patterns are usually required to be in the foundry



as soon as finished, and rapping plates are seldom thought of until the last minute. As a natural consequence the patterns are hurried to the foundry without plates, and after a few castings are made are returned for expensive repairs. We illustrate herewith an improved plate with key attachment, etc., which is undoubtedly a most convenient article for the purpose intended especially in view of the low price asked for it. After the pattern has been rapped in the usual way, the draw key is inserted and turned until it becomes rigid from the projections on the end working against the two wedge-shaped sides beneath the plate and in this way the molder can readily withdraw the pattern, being enabled to "feel" it out of the mold owing to the rigidity of the hook.

The plates are made of the best cast steel in six sizes with a key for each.

The plates have beveled edges and are shaped after the most approved design, the outer edge of each plate conforming to three circles, thus allowing them to be easily and speedily placed on patterns by the use of two bits corresponding to size of circles or one extension bit.

HE—"I don't see as much of you in town as I did at the seashore."

SHE (blushing—"Well, I should hope not."

"I can get you a job of hauling iron for a foundry," said the employment agent. "I pass," responded the idle man. "I don't intend to be an Iron Haller the second time, thank you."—*Exchange.*

The Jos. Dixon Crucible Co. have beeu awarded space in the mines building in the Columbian Exposition for a general exhibit of their graphite productions, such as crucibles, lubricating graphite, graphite axle grease, plumbago facings, graphite machine and railway grease, Dixon's stove polish, silicia-graphite paint, core wash, electrotyping graphite, graphite cylinder oil, graphite specialties for electrical and other work, etc. In the manufacturers' building they have space for a display of their pencils and pencil sundries.

The Springfield Steel Casting Foundry at Springfield, Ohio, has just put in a Siemens-Martin open hearth steel plant for the manufacture of all kinds of steel castings. The company also operate an open hearth steel plant.

ITEMS OF INTEREST.

The foundry and machine shop of F. P. Lannon & Company, Pueblo, Col., was burned March 4th. The loss includes a fine line of patterns and machinery.

The Hamilton (Ohio) Foundry & Machine Company was founded only a year ago by some local capitalists and mechanics and already employs 75 men.

The Berlin Iron Bridge Co., of East Berlin, Conn., are at work putting up the roof trusses on the new light and power station for The Electric Light & Power Co., at Syracuse, N. Y.

The reports read at the usual meeting of the Paxton and Vierling Iron Works, at Omaha, Neb., showed an increase in the business amounting to 14 per cent. over the previous year. The directors of this company will meet at an early date to examine into plans looking toward substantial improvements.

The Ranken & Fritsch Foundry and Machine Company of St. Louis, Mo., is casting an enormous fly-wheel for the Springfield (Ill.) Iron Company. It will be made in two pieces, each weighing 25,500 pounds, and will be used in connection with extensive improvements now under way in the steel department of the Springfield company.

Alexander Milmine, well known in connection with the foundry business at Toledo, O., died Feb. 14, in his 70th year. Deceased was born in Grimsby, Ont., in 1822, and came to this country in early manhood, living in Racine, Wis., and Grand Rapids, Mich., going from the latter place with his oldest son, H. B. Milmine, to the war where they were with Sherman in his march to the sea. Returning to Grand Rapids, he started a foundry and cooper shop, removing in 1872 to Toledo where he has remained ever since.

Nichols, Shepard & Co., Battle Creek, Mich., the great threshing machine people, have just made the third annual distribution of stock to their workmen, giving 23 of them $250 each of paid up non-assessable stock that is held above par, and is earning good dividends. In the experience of this firm this is the best solution of the vexed labor question, as it gives the employee a regular stated salary and the opportunity of sharing in the profits of the firm and the products of their labor. It also incites them to faithful service, as they are interested in having the business a success.

NOTICE.

All advertisements under this head given two insertions free of charge when placed therein by subscribers. All others will be charged 2 cents per word for each insertion.

MOLDERS—Two first-class green sand floor molders, must be used to heavy work. To steady temperate men we offer permanent employment, no others need apply. Address, stating wages expected, state experience and give references, Fairhaven Iron Foundry Co., P. O. Box 593, Fairhaven, Mass.

FOUNDRY FOREMAN AND SUPERINTENDENT—Young man with 14 years experience in all branches of the mall. and grey iron business desires to make a change about July 1st. Good record from some of the most prominent men in the trade. Terms reasonable with good prospects of advancement. This Office.

WANTED HELP—Wanted by the Hastings Iron Works, Hastings, Neb., a competent molder for general work, also a good pattern-maker. *

A PRACTICAL FOUNDRY FOREMAN of long experience in its different branches, having eighteen years experience in the manufacture of car wheels, desires a position. Address this office. *

FOUNDRY FOREMAN—A man with 15 years experience as such, desires to make a change; can furnish A 1 references as to ability and reliability. Distance no object. Address, Change, care this office. *

FOUNDRY FOREMAN—Should you desire to make a change in your foundry management and secure a capable man with the best of references, address W. P. B., care of The Foundry, *

Advertisements inserted under this head for 25 cents a line each insertion.

FOR SALE—Foundry and Machine Shop in a flourishing manufacturing city; a good farming country and a small capital required. Address, WM. ENGBRING, Cedarburg, Wis.

FOR SALE CHEAP—In Paw Paw, Mich., on Toledo & South Haven R.R., a small Foundry and Machine Shop the latter doing good business and the foundry only needs a good man to work up a steady trade; everything complete; good chance to right man. Address, A. J. Sabin, Paw Paw, Mich.

FOR SALE AT A BARGAIN—One No. 3 Root blower, second-hand, in good condition. Apply to Foundry Department, Hopedale Machine Co., Hopedale, Mass.

MARKET REVIEW.

REPORTED EXPRESSLY FOR "THE FOUNDRY."

There can be no doubt that during the past month pig iron dealers and those they represent, viz: the furnaces, have been feeling easier both as regards the outlook as far as the future demand is concerned and the probable prices that may be realized.

That the bottom has been reached, all seem to concede and unless some return can be secured on the enormous capital invested in the pig iron producing business, furnace men would simply close up their shops, as it is believed that but few of them are in the business for their health. Buyers, as a rule, have been more approachable and considerable pur-

chasing is going to be done before long which may have the effect of stiffening prices, terms, etc.

The cutting of prices seems to continue principally among southern irons, and we have reports to the effect that gray forge has been quoted as low as $8 in the St. Louis market.

The Detroit market shows no particular change except an appreciation in values among the Lake Superior Charcoal Irons caused principally by a short visible supply.

In Pittsburgh prices seem stiffer with an upward tendency.

In Chicago the opening of the season shows some buying being done at former prices, while in Philadelphia there have been many large sales in excess of what had been anticipated. Our correspondents report as follows:

CINCINNATI.

March 4, 1893.

We quote for cash f. o. b. cars Cincinnati :

Southern Coke, No. 1, F'dry	$13 25 to $13 50
" " No. 2, " and No. 1 Soft,	12 00 to 12 25
Hanging Rock Coke, No. 1	15 50 to 16 00
" " Charcoal, No. 1	18 50 to 19 50
Tennessee Charcoal, No. 1	16 00 to 16 50
Jackson Co. Stone Coal, No. 1	16 00 to 16 50
Southern Coke, Gray Forge	11 00 to 11 25
" " Mottled	10 75 to 11 00
Standard Alabama Car Wheel	18 00 to 19 00
Tennessee " "	17 00 to 17 50
Lake Superior " "	17 50 to 18 00

Rogers, Brown & Co.

CHICAGO.

March 4, 1893.

We quote for cash f. o. b. Chicago:

Southern No. 1 Soft	$13 35 to $13 60
Southern No. 2 Soft	12 85 to 13 00

Rogers, Brown & Merwin.

BOSTON.

March 4, 1893.

We quote for cash delivered Boston :

Alabama No. 1 Foundry	$15 59 to $16 00
" " 2 " and No. 1 Soft	14 50 to 15 00
" " 3 " " 2 "	14 00 to 14 50
" " C. C. Car Wheel	20 00 to 20 50
Strong L. S. Coke Iron No. 1 Foundry	17 25 to 17 75
Lake Superior Charcoal Car Wheel	19 50 to 20 00
American Scotch (Northern) No. 1	17 00 to 17 50

Rogers, Brown & Co.
F. G. Gibbs, Resident Agent.

ST. LOUIS.

March 4, 1893.

We quote for cash f o. b St. Louis :

Southern Coke, No. 1	$13 75 to $14 00
" " No. 2	12 50 to 12 75
" " No. 3	12 25 to 12 50
" Gray Forge	11 50 to 11 75
" Charcoal No 1	15 50 to 16 00
Missouri " No. 1	14 00 to 14 50
Ohio Softeners	16 50 to 17 00
Lake Superior Car Wheel	17 50 to 18 00
Southern " "	18 25 to 18 50
Frick's Connellsville Foundry Coke	5 65

Rogers, Brown & Meacham.
J. K. Pollock, Manager

BUFFALO.

March 4, 1893.

We quote for cash f. o. b. Buffalo.

No. 1 X Foundry, Strong, Coke Iron, Lake Superior ore	$15 00
No. 2 X Foundry, Strong, Coke Iron, Lake Superior ore	14 00
Ohio Strong Softener No. 1	15 00
Jackson County Silvery No. 1	$17 00 to 17 30
Lake Superior Charcoal	17 25
Tennessee Charcoal	18 00
Southern Soft No. 1	$13 90 14 15
Alabama Car Wheel	19 00
Hanging Rock Charcoal	20 50

Rogers, Brown & Co.
W. T. Shepard, Mgr.

PHILADELPHIA.

March 4, 1893.

We quote for cash f. o. b. cars Philadelphia.

Standard Ala. No. 1 X	$15 00 to $15 50
" " No. 2 X	14 00 to 14 50
Embree or Equivalent, No. 1, X	15 25 to 15 50
" " No. 2. X	14 25 to 14 50
Strong Lake Ore Coke Iron, No. 1 X	16 00 to 16 50
" " " " No. 2 X	15 00 to 15 50
Lake Superior Charcoal	18 50 to 19 00
Standard Alabama C. C. C W	20 00 to 20 50

Rogers, Brown & Warner.

NEW YORK.

March 4, 1893.

We quote for cash f. o. b. New York.

No. 1 Foundry, Lake Ore, Coke Iron	$16 00 to $16 50
No. 2 " "	15 00 to 15 50
No. 1 American-Scotch	16 00 to 16 50
No. 2 "	15 00 to 15 50
No 1 Standard Southern	15 00 to 15 25
No. 2 " " and No. 1 Soft	14 00 to 14 50
Standard Southern Car Wheel	20 00 to 21 00

Rogers, Brown and Warner.

DETROIT.

March 4, 1893.

Lake Superior Charcoal, all numbers	$16 50 to $17 00
" " Coke Bessemer	15 00 to 15 50
" " Coke Foundry, all ore	15 50 to 16 00
Standard Ohio Black Band (40 per cent.)	15 50 to 16 00
Southern No. 1 Foundry	14 25 to 14 50
" No. 2 Foundry	13 75 to 14 00
" No. 2 Soft	13 25 to 13 50
" Grey Forge	12 50 to 13 00
Jackson County Ohio Silvery	17 25 to 17 75

Wm. F. Jarvis & Co.

PITTSBURGH.

March 3, 1893.

Quotations are as follows:

No. 1 Foundry	$14 25 to $14 50 cash.
No. 2 Foundry	13 25 to 13 50 "
Gray Forge	12 25 to 12 50 "
Warm Blast Charcoal	18 00 to 22 00 "
Cold Blast Charcoal	22 00 to 27 00 "
Bessemer	13 40 to 13 75 "

A. H. Childs.

LOUISVILLE.

March 4, 1893.

We quote for cash cars Louisville:

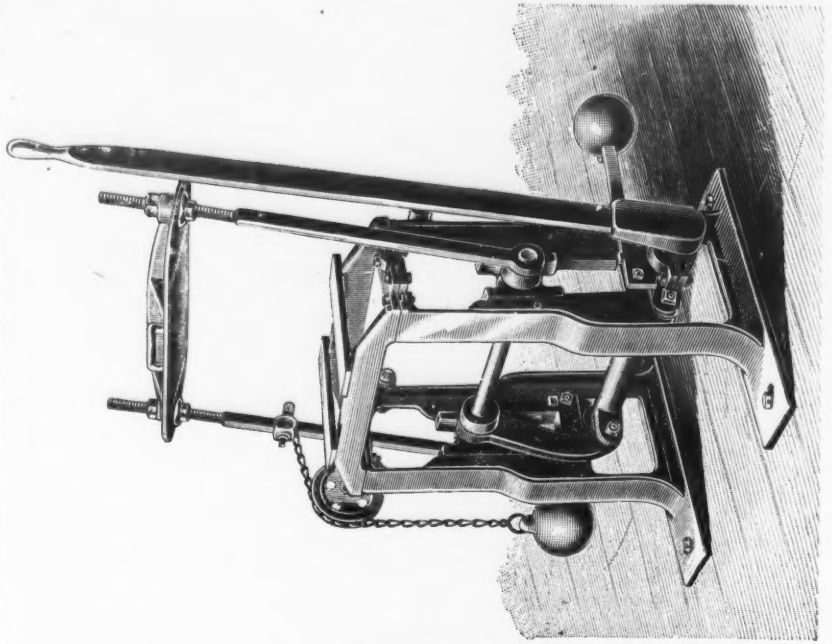
Southern Coke, No. 1 foundry	$13 00 to $13 25
" " " 2 "	12 00 to 12 25
" " " 3 "	11 00 to 11 25
" " Grey Forge	10 75 to 11 00
" Charcoal, No. 1 foundry	15 00 to 16 00
" Car Wheel	17 50 to 17 75

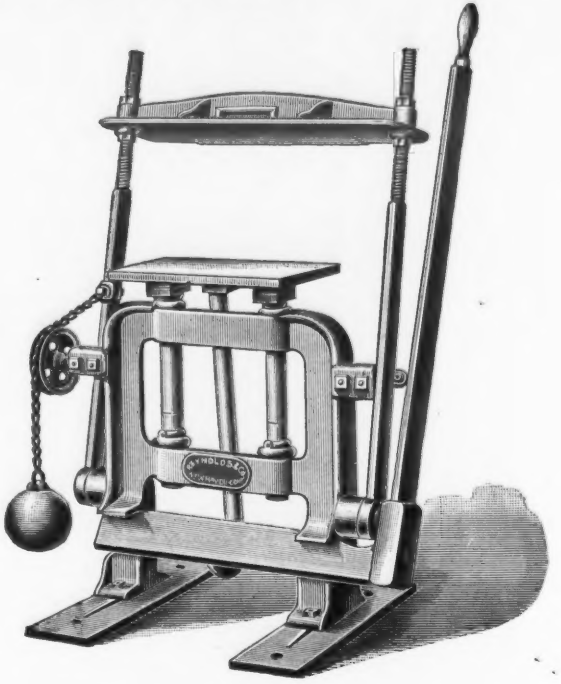
Geo. H. Hull & Co.

HAND & DRAW PLATE MOLDING MACHINES

OLDEST, SIMPLEST, MOST THOROUGHLY TESTED, BEST.

Thousands in use in Leading Foundries throughout the Country.





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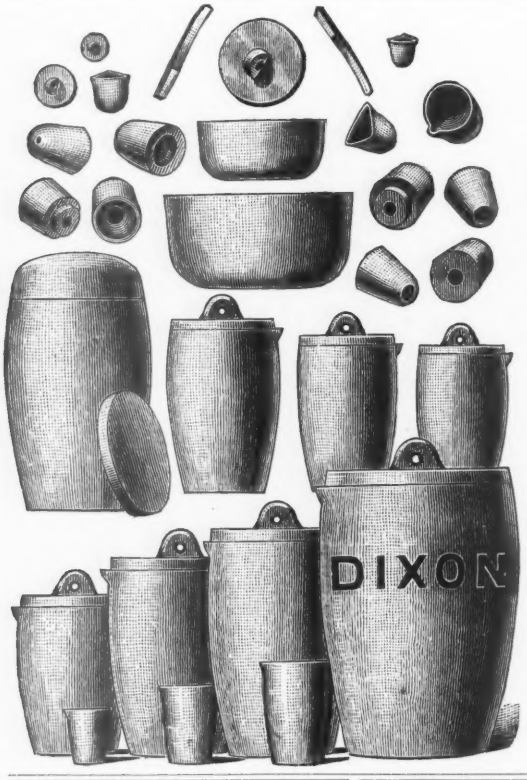

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PLUMBAGO OR BLACK LEAD

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Have been known among foundry men for nearly three score and ten years. They are considered by governments and smelters throughout the world as the

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For Quality and Long Life.

We employ only skilled and experienced workmen and use the best material. We invite inquiries for circulars, etc., from all who are interested in blacklead crucibles or other graphite productions.

Jos. Dixon Crucible Co.

JERSEY CITY, N. J.

575 Page Book FREE!

For a limited time the *Scientific Machinist* will give to every yearly subscriber a 575 page book in general mechanics, entitled "THE MECHANICS COMPLETE LIBRARY." The book is sent post-paid on receipt of price of paper for one year—$1.50. Price of book is the same per copy—cloth binding—as that of the paper. Send for sample copy of our paper which contains the advertisement. Club rates on application.

The Scientific Machinist Co.

CLEVELAND, O.

Toledo Art Tile and Fire Brick Co.

SUCCESSORS TO THE CERAMIC COMPANY.

Manufacturers of

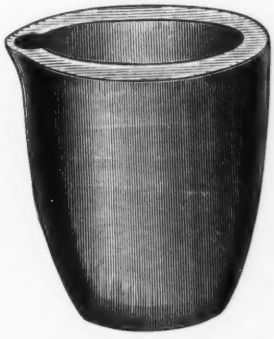
FIRE BRICK AND CLAY,

Cupola Blocks and Brick a Specialty.

Works on Grand Street, at Crossing of Belt Railroad, East Toledo.

OFFICE: 209 Madison Street.

TOLEDO, OHIO.



CRUCIBLE AND RETORTS.

The Hussman Crucibles are made from the choicest Ceylon Plumbago, full size, and will endure the Greatest Heat and Produce the Best results.

PLUMBAGO.

We carry one of the Largest stocks of Imported Plumbago and German Lead west of the Atlantic. Our Plumbago is the Purest "Ceylon," suitable for Foundry Facings, Lubricants, Etc. We defy competition, either in Single Barrels or Car Loads.

HUSSMAN CRUCIBLE CO.,

Mention The Foundry. **St. Louis, Mo.**

MOULDING SAND,

Fire Sand, Glass Sand, Fire Clay, Ground Fire Clay, Fire Brick, Circle Brick for lining Cupolas. Bristle Brushes, Steel Wire Brushes. Bellows, Riddles, Shovels, Pig Iron Barrows, Foundry Facings. Ask for our prices before buying.

The J. Downerd & Son Co.,

216 Main Street, **ZANESVILLE, O.**

THE A B C OF IRON.

By CHARLES W. SISSON.

The best work on the subject of IRON that has ever yet been published. Especially valuable to Foundry Foreman, Superintendents, Melters, and Buyers of Iron generally. Learn how to know the kind of Iron you are using and how to mix it to advantage, to get the strength, density, softness or hardness, etc., required.

CONTENTS:

Iron—what is it?—A description of the metal and its uses, showing in what combinations it is found and the principal sources. Pig Iron.—An acc ount of the blast furnace process by which the ores are reduced to Pig Iron. Constituents of Iron.—A description of the elements in pig metal which influences cast iron. Described in chapters on Carbon in Cast Iron, Silicon in Cast Iron, Phosphorus in Cast Iron, Manganese in Cast Iron, Sulphur in Cast Iron. Numbering of Pig Iron.—Showing the character and analysis of different grades of Pig Iron, appearance of fracture and the uses to which the several grades are adapted. Grading of Iron.—Should it be by analysis or by fracture? How to reduce cost of mixture. Steel. Physical properties of metals defined.—Table of shrinkage of castings. Weights of castings from patterns, etc. Statistics.—Showing the varieties and productions of Iron Ore, Pig Iron, Pig Iron and Steel products, Railroad Mileage and Equipment, etc., etc., etc. Early history and Manufacture of Iron.—Brief history of the manufacture and uses of Iron from earliest times, being principally extracts from Mr. James M. Swank's "History of Iron in all Ages."

Price, $2.00; With The Foundry one Year $2.50.

SOMETHING NEW

We have the Best and Cheapest device on earth for drawing Patterns from the Sand. Send postal for full particulars to

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Testimonials from the Largest concerns.

Challen's Contract and Order Records Adapted to any business or profession, ruled with printed headings, and indexed through to require the least possible writing to enter data, and refer quickly to any name and save time and money. **5,000 Used and Reordered.** All kinds of Labor Saving Records on hand or made to order.

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ALREADY MADE

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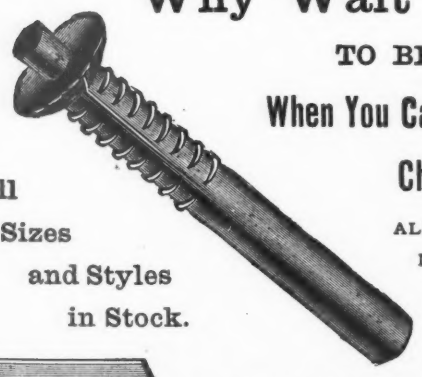
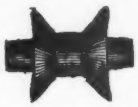
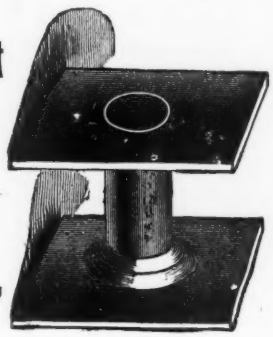


Furnished in Quantities to suit.

For Less than One-Fourth the Cost

TO MAKE THEM?





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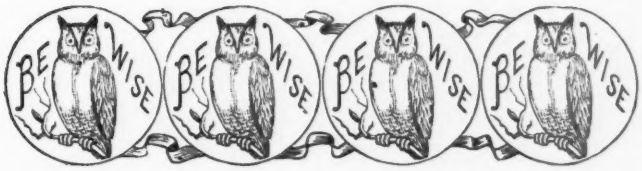
Cleveland, Ohio.



The Largest Pattern Works in the World.

Most of our machinery designed and built by us for this particular work.

All labor systematized into specialties. Only shop practising division of labor.

We manufacture patterns, others make them.
Our workmen are experts hired for what they can do, not for what they will try and learn to do.
It is absolutely true that all patterns for castings made elsewhere, of like quality, cost from 10 per cent. to 100 per cent. more than here. Therefore, if we do not make your patterns, you are needlessly throwing money away.

THE GOBEILLE PATTERN COMPANY.

CLEVELAND, O., U. S. A.

THE BLAKENEY CUPOLA FURNACE

IS GUARANTEED

IF YOU WISH TO IMPROVE YOUR MELTING FACILITIES, IT WILL PAY YOU TO INVESTIGATE OUR ILLUSTRATED CATALOGUE AND PRICE LIST. SENT FREE.

To be More Economical. To Melt Faster. To Produce Iron of a More Uniform Grade and Strength. To be entirely Free from Clogging. To have the most Perfect Combustion. To be Lower in Price than any Cupola on the Market

Has Been Adopted by the U. S. Navy Department.

THE

THE M. STEELE CO.,

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WE ARE HEADQUARTERS FOR

High Grade Machinery Castings,
Machine Molded Pulley Castings,

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Fly Wheel Castings,

—AND—

Have Modern Equipment for Finishing the Same. Address,

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CHICAGO, ILLS.

THE IRON FOUNDER.

A COMPREHENSIVE TREATISE ON

THE ART OF MOULDING,

INCLUDING CHAPTERS ON

Core-Making; Loam, Dry-Sand and Green-Sand Moulding; Also Crystalization, Shrinkage and Contraction of Cast Iron and a full explanation of the Science of Pressures in moulds; added to which are Formulas for Mixtures of Iron, Tables, Rules and Miscellaneous information.

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THE FOUNDRY,

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BURR K. FIELD, Vice-President
GEO. H. SAGE, Secretary.
F. L. WILCOX, Treasurer.

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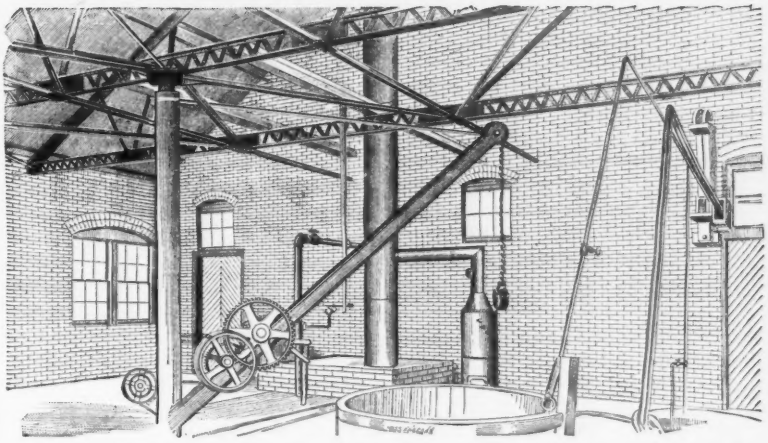
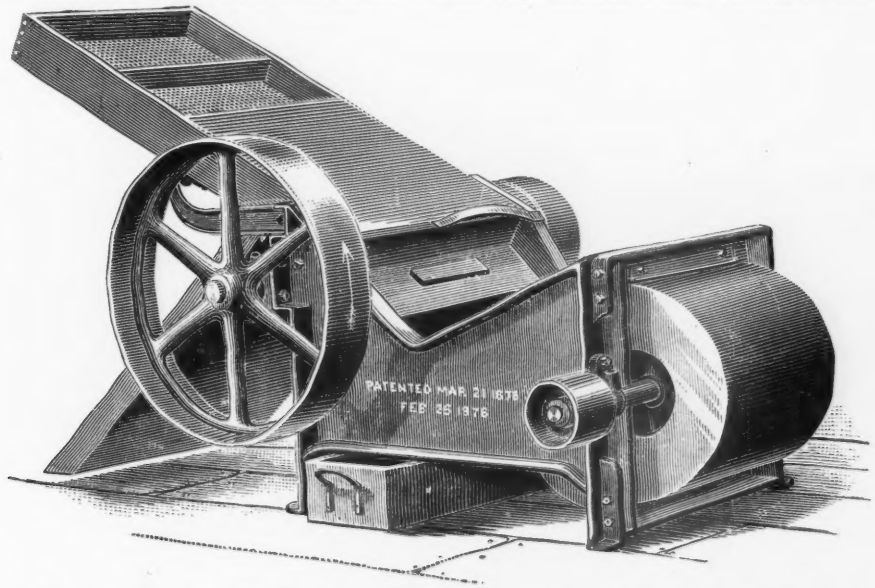


The above illustration is taken direct from a photograph, and shows the construction of an Iron Truss Roof, designed and built by us for The Fowler Nail Co., at Seymour, Conn. The building is 44 ft. in width by 62 ft. in length, and is used for a Casting Shop, where the danger from fire is very great. The side walls being of brick and the roof trusses of iron, the danger is entirely eliminated.

ENGINEERS, ARCHITECTS,
—AND BUILDERS OF—
Iron & Steel Bridges, Roofs & Buildings

Office and Works, - - - EAST BERLIN, CONNECTICUT.



The Woodruff Patent Separating Machine.

Saves all shot and scale iron from foundry refuse. Used, appreciated and commended by Leading Founders in all parts of the country.

THE AUDUBON MACHINE WORKS,

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Foundry Facings, Blackings and Supplies.

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It is a well known fact that the Pittsburgh Coal contains less sulphur and slate and is rich in carbon, which makes them at least 25% stronger than other Coals for Facings.

HEAVY LEAD

This Facing is made from a mixture of mineral and plumbago. We do not claim that this is as good as pure plumbago; but the success we have had with it, warrants us in saying that it is the best of all **Cheap Facings and Blackings.** The 15% of plumbago gives it body which mineral Facings do not have.

CORE WASH

If you have any trouble with your cores, please write us, as we make an article suitable for all kinds of work.

We will be pleased to give you quotations and samples on these or any Material you may need in the Facing or Supply Line. Give us a Trial.

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The Garden City Sand Co.

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CORE AND WHITE OR FIRE SAND FROM OUR MINES.

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AWAY back in the dusts of antiquity, long before the dawn of the Christian Era, the Brass Worker struggled with the difficulties peculiar to his trade. His descendents, or some of them, are still struggling because they do not use our

BRASS FACING

This material is far ahead of Charcoal or Flour and will produce the smooth surface so much desired. The march of progress has also done much for the core maker; many compounds have come and gone, ours

IS A SUCCESS

For Little Cores, Big Cores or any Cores at all. If you are now making cores with Oil, Flour, Rosin, etc. you will have much better results if you use our Core Compound. Try a sample barrel subject to approval.

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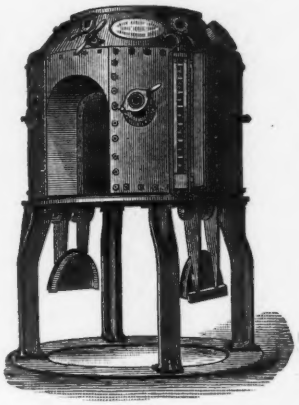

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COLUMBIA, PA., August 29th, '92.

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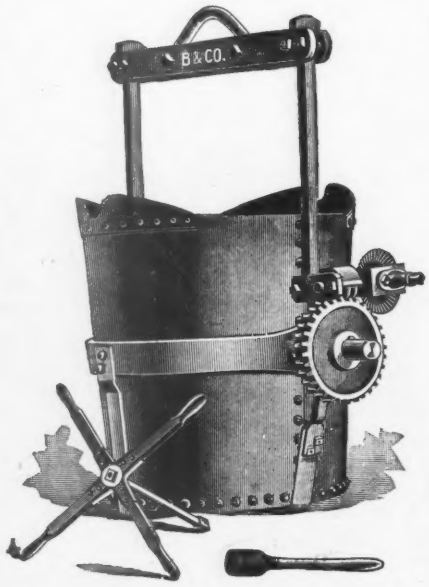

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